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Cover: Seebee Deposit Vein 2 looking northeast. Note the near vertical mineral lineation in the sheared gabbro host rock (at left). The gold-bearing tourmaline-quartz vein system plunges 35° to 45° to the northeast.

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Foreword

Dr. Delaney has spent the past five years geologically remapping and studying parts of the Glennie Domain. He has a strong belief, which I share, that the Glennie Domain is rich exploration ground for metallic and precious metal deposits, particularly gold. In this report he has put together a summary of the known gold showings and prospects in the domain. These have been largely interpreted as related to high strain and shear zones in Early Proterozoic greenstone belt associations, but this is not to exclude other potential environments.

It is our hope that this report will serve to further stimulate existing exploration by the mineral industry in this part of the Saskatchewan Precambrian Shield area.

The project, from which this report derives, was funded in 1990-91 under the Saskatchewan Partnership Agreement on Mineral Development, 1990-95.

R. Macdonald
Chief Geologist
Saskatchewan Geological Survey
September 1991

Abstract

Over seventy gold occurrences have been discovered to date in the Glennie Domain, several of them as recently as in the past few years. Gold showings are contained in or adjacent to, greenstone belts. The majority, including the Seabee deposit, are hosted in the extensive Pine Lake Greenstone Belt. In all greenstone belts investigated, the volcanic rocks are primarily tholeiitic varieties formed in juvenile island arc settings. Gold showings occur in a variety of rock types: volcanics, plutons (including both subvolcanic as well as younger post-volcanic suites), volcaniclastics, sediments and migmatites. Those parts of the Glennie Domain with gold showings, have been subjected to upper greenschist to amphibolite facies metamorphism.

Most gold showings are structurally controlled (e.g. Seabee, 'Georges Lake' and Manawan), although a few are hosted by intrusive rocks (e.g. Kalix, and Jena in the Brownell Lake Pluton) and sedimentary rocks (e.g. Pine Lake Joint Venture and 'Santoy Lake'). Gold also occurs as an accessory phase of volcanogenic massive sulphides. Structurally-hosted showings, although spatially associated with major structures, typically occur in secondary or higher order structures. In most structurally-hosted showings, as well as the intrusive- and sediment-hosted varieties, gold is contained within and adjacent to quartz veins; many of the veins are multistage but not all stages are mineralized. Although the element association of the quartz veins is variable, there appears to be local distinctive associations. For example, tourmaline occurs in most veins within or adjacent to the Laonil Lake Intrusive Complex and arsenopyrite is found in all showings (both structural- and plutonic-hosted) in the Brownell–Wapawekka Lakes Greenstone Belt. Timing of mineralization was late in the thermotectonic evolution of the domain. Although commonly underrated in exploration strategies, the Glennie Domain has good potential for the discovery of additional significant gold orebodies.

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Introduction

In 1984, W.C. Coombe compiled a comprehensive summary of gold occurrences in Saskatchewan (Coombe, 1984). In subsequent years there has been a significant increase in gold exploration and much new information has become available both for known occurrences as well as new discoveries. In order to advance exploration modelling, it is important to amend and build upon Coombe's invaluable work. This report presents a preliminary synthesis of all known gold deposits and prospects in the Glennie Domain of the Lower Proterozoic Trans-Hudson Orogen, northern Saskatchewan. The Glennie Domain was selected for this study because, since 1986, the author has had the opportunity to undertake 1:20 000 scale mapping in many areas of the domain that host gold mineralization. From this work it is apparent that the Glennie Domain has significant but commonly underrated potential for the discovery of gold mineralization in a variety of settings.

Regional Geological Setting

The southeastern part of the exposed Precambrian Shield of Saskatchewan is underlain by a northeast-trending collage composed primarily of juvenile Proterozoic crust including island arc assemblages. These formed in the internal part of the Trans-Hudson Orogen (Hoffman, 1981, 1990) in an extensive Early Proterozoic collision zone between the Superior Province and at least two other Archean cratons to the west and northwest (Ray and Wanless, 1980; Lewry, 1981a; Lewry and Collerson, 1990). This internal zone of the Trans-Hudson Orogen, named the Reindeer Zone in Manitoba and Saskatchewan (modified definition of Stauffer (1984) by Lewry and Collerson (1990)), is mantled along its northwest margin by the Wathman–Chipewyan Batholith, a major batholith interpreted as a continental margin type magmatic arc similar to that formed in the Andes (Figure 1; Ray and Wanless, 1980). In Saskatchewan, the external part of the Trans-Hudson Orogen, as defined by Hoffman (1990), comprises the Wollaston Group (Sibbald *et al.*, 1977), the remnant of a miogeoclinal succession, which has been infolded into the remobilized margin of the Hearne Province, an Archean craton to the northwest. As observed by Lewry and Collerson (1990) however, additional investigations are required to resolve the tectonic evolution of this part of the orogen.

The Reindeer Zone of the Trans-Hudson Orogen has been subdivided into a number of distinct two-dimensional lithostructural domains as set up originally by Lewry and Sibbald (1977) and subsequently modified by a number of authors (i.e. Saskatchewan Geological Survey, 1987; Figure 1). The northeast-trending La Ronge Domain contains a number of subdivisions. The Central Metavolcanic Belt is composed of island arc tholeiitic to calc-alkaline volcanics and volcaniclastics intruded by a series of discrete small to medium plutons. The wackes of the adjoining Crew Lake Belt are interpreted as back arc detritus from the Central Metavolcanic Belt. The Crew Lake Belt is intruded on the northwest by the Hickson Lake Pluton or merges into migmatites of the Rottenstone Domain. High metamorphic grade complexes composed mostly of plutonic rocks, the Numabin Complex and the La Ronge Horseshoe terrane, bound the Central Metavolcanic Belt on the northeast and southwest sides respectively. The McLennan Lake Tectonic Zone, a northwesterly-dipping, high-strain zone separates the Central Metavolcanic Belt from the MacLean Lake Belt to the southeast. Much of the MacLean Lake Belt is underlain by the MacLean Lake Gneisses comprising volcanogenic greywackes and minor polymict fanglomerates. The MacLean Lake gneisses are overlain by a molasse-type sequence of arkoses and conglomerates of the McLennan Group.

The Glennie Domain is characterized by arcuate belts of Lower Proterozoic supracrustal rocks including island arc volcanogenic successions amongst variably reworked granitoids. In the western part of the domain the Lower Proterozoic rocks contain zones of generally shallow-dipping, highly strained rocks which are immediately underlain by Archean basement gneisses in the Iskwatikin and Hunter Bay Domes (Lewry and Slimmon, 1985; Chiarenzelli *et al.*, 1987; Lewry *et al.*, 1990). The western boundary of the Glennie Domain is defined by the Stanley Shear Zone, a one to four kilometre-wide, north-northeasterly-trending 'straight zone' which was subjected to early heterogeneous ductile strain and subsequent late brittle deformation (Lewry *et al.*, 1980; Lewry, 1981c). The north-trending Tabbernor Zone, at or near the eastern boundary of the Glennie Domain, is characterized by tight north-south folds, locally high metamorphic gradients and the early mylonitic to late brittle Tabbernor Fault System (Macdonald, 1975b; Sibbald, 1978; Wilcox, 1990). The Hanson Lake Block is underlain by low grade volcanic successions in the south (Byers, 1957; Coleman *et al.*, 1970; Macdonald and MacQuarrie, 1978; Sibbald, 1989) and high grade, more deformed rocks in the north including the late Archean Sahli Granite, a possible Archean mantled gneiss dome (Macdonald, 1977). The Hanson Lake Block is bounded on the west by the Tabbernor Fault and to some extent on the east by the Sturgeon-weir Fault.

The Flin Flon Domain to the east is generally underlain by greenschist facies volcanogenic rocks of the Amisk Group which in turn is unconformably overlain by a molasse sequence, the Missi Group. This sequence is intruded by plutons of various ages.

Supracrustal rocks of the Kisseynew Domain are subdivided into two assemblages; a lower sequence consisting mostly of metamorphosed greywacke with spatially associated volcanic and volcaniclastic rocks and an upper assemblage comprising mostly arkosic gneisses with subordinate polymict conglomerate, greywacke, and volcanic and volcaniclastic rocks (Ashton and Wheatley, 1985, 1986; Ashton *et al.*, 1986). These Kisseynew rocks have been subjected to multi-phased deformation (Ashton and Wheatley, 1986) and intruded by a variety of granitoids including voluminous anatectic melts in the north central part of the domain (Saskatchewan Geological Survey, 1987). Supracrustal successions in the Kisseynew Domain have been correlated with the Amisk and Missi Group of the adjoining Flin Flon Domain; the boundary between the two domains is interpreted to represent a change in metamorphic grade and structural style rather than a stratigraphic break as inferred from earlier investigations (Ashton *et al.*, 1987).

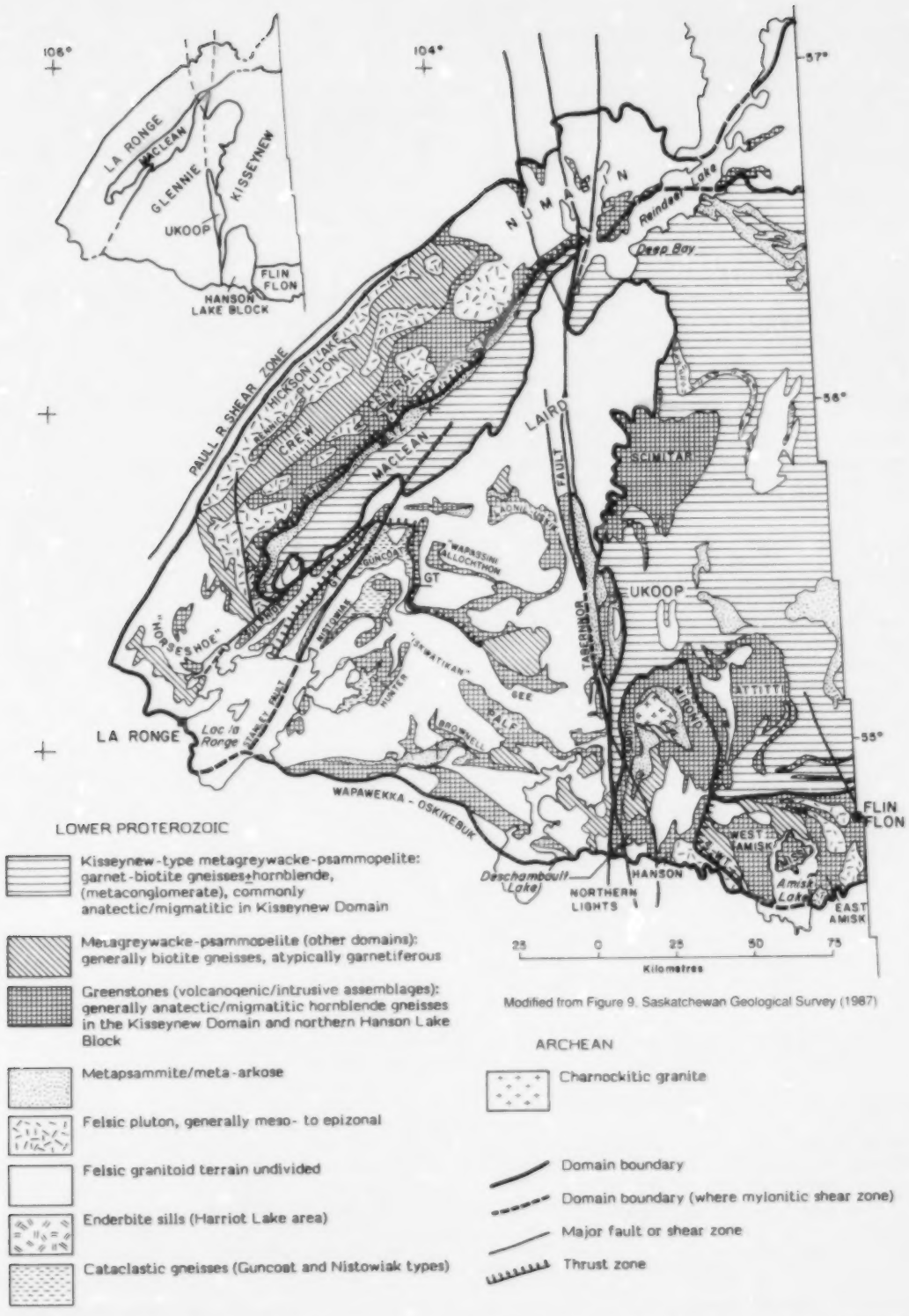

Figure 1 - Major geological elements of the southeastern part of the Precambrian Shield of Saskatchewan. MLTZ=McLennan Tectonic Zone; GT=Guncoat Thrust; and SWT=Sturgeon-weir Thrust.

Geology of the Glennie Domain

The Glennie Domain contains complexly deformed elongate, generally narrow and arcuate belts of supracrustal rocks. Lower Proterozoic and locally Archean granitoid rocks make up the major part of the domain (Figure 2). The supracrustal rocks can be divided into three distinct assemblages: volcanogenic, arkosic and pelitic/psammopelitic.

Volcanogenic assemblages comprise volcanics, syn-volcanic intrusives, volcaniclastics and associated sediments. In most of these assemblages (such as the Pine Lake Metavolcanics, the Brownell Lake Group and the Gee Lake Metavolcanics) the volcanics are predominantly mafic to intermediate flows and fragmentals. Subordinate felsic varieties include sodic rhyolites and dacites of the Pine Lake Metavolcanics in the Porky and Pine Lakes area. Preliminary geochemical investigations suggest that most of these volcanics are tholeiitic and that they were emplaced in a primitive island arc setting or at a mid-ocean ridge spreading centre (Delaney, in prep.; Slimmon, pers. comm., 1990).

The arkosic assemblage comprises arkose, conglomeratic arkose, grit and conglomerate. Examples include the Porky Lake Psammites or Siliciclastics (Lewry, 1977; Delaney, 1986), the Ourom Lake Meta-arkoses (Budding and Kirkland, 1956; Delaney; 1987; Delaney *et al.*, 1988) and the Wapawekka Lake Formation (Padgham, 1966a, 1968; Delaney, 1988, 1989). Although relationships with the volcanogenic assemblages are commonly masked by subsequent episodes of deformation, where they have been examined in detail, these molasse-like assemblages are generally significantly younger than the volcanogenic assemblages.

Pelitic and psammopelitic assemblages include those east of Sadler Lake (Chakrabarti, 1968 and 1969; Slimmon, 1989), around Glennie Lake (Lewry, 1977) and north of Porky Lake (in the core of the Ray Lake Synform (Johnston, 1968; Lewry, 1977; Delaney, 1986)). In some areas, such as north of Porky Lake, these pelitic rocks are the contemporaneous basinal equivalent of the arkosic rocks; relationships elsewhere are obscure.

Apart from the known remnants of older Archean granitoids, much of the granitic terrane in the Glennie Domain is a complex of granitoids of various Lower Proterozoic ages.

Detailed U-Pb zircon, monazite, apatite and sphene geochronological investigations have been completed in an area along the western edge of the Glennie Domain (Chiarenzelli, 1989). For most of the domain, however, including the areas discussed in this paper, the geochronological database is more sparse (Figure 3). In nappe sheets in the Nistowiak and Iskwatikin Lakes area, along the west side of the domain, Chiarenzelli (1989) recognized Archean rock at least 2800 Ma old that is interlayered with or intruded by younger Archean granitoids. Elsewhere in the domain, the oldest rock is a 1893 ±35 Ma granitoid, the Carroll Lake gneiss, in the south central part of the domain (Van Schmus *et al.*, 1987). A quartz diorite phase from the Laonil Lake Intrusive Complex, which contains remnants of volcanic rocks, has been dated at 1889 ±8.7 Ma (Chiarenzelli, 1989).

Three dates have been determined for volcanic sequences (Figure 3): 1881 ±7 Ma for the Palf Lake rhyolite (*ibid*); 1866 for a highly strained rhyolite from a felsic volcanic horizon in the Gee Lake Metavolcanics (Slimmon, 1988; Delaney *et al.*, 1990) and 1838 ±2 Ma for a sodic rhyolite from the Pine Lake Greenstone Belt at a locality north of Laonil Lake where this supracrustal succession unconformably overlies the Laonil Lake Intrusive Complex (Delaney, 1986; McNicoll *et al.*, in press). In addition, a date of 1837 ±7 Ma was obtained from a dioritic gneiss, interpreted to be an andesitic flow or shallow intrusive, that was collected in the Nistowiak Lake area (Chiarenzelli, 1989). A major phase of tonalitic to granodioritic plutonism, which formed the Eyahpaise Pluton, the Wykes Lake Granodiorite, the Wood Lake Batholith, the Deschambault Narrows tonalite and intrusions in the Nistowiak–Iskwatikin Lakes area, occurred during the period 1859 to 1846 Ma (Bickford *et al.*, 1987; Delaney *et al.*, 1988; Chiarenzelli, 1989).

Dating of detrital zircon grains from the Ourom Lake meta-arkose, which is intercalated with the Pine Lake Metavolcanics along the Tabbernor Fault, revealed that this unit was derived from rocks 1850 to 1863 Ma old (Delaney *et al.*, 1988). In the Brownell–Wapawekka Lakes Greenstone Belt, detrital zircons in arkoses of the Wapawekka Lake Formation yielded U-Pb dates that ranged from 1888 to 1848 Ma; these arkoses were subsequently intruded by feldspar porphyry dikes at 1834 ±5 Ma (McNicoll *et al.*, in press).

A younger phase of plutonism, between 1836 and 1830 Ma, emplaced a small intrusion in the core of the Eyahpaise Pluton (Bickford *et al.*, 1987) as well as several intrusions in the southern part of the domain including the Brownell Lake and Maynard Creek Plutons (Figure 3; McNicoll *et al.*, in press). Four monazite samples from syntectonic to post tectonic granites and pegmatites in the Nistowiak–Iskwatikin Lakes area of the Glennie Domain yielded dates of 1762 to 1770 Ma and are interpreted to be the age of crystallization (Chiarenzelli, 1989). U-Pb sphene ages, also from rocks in the western part of the domain, ranged from 1773 to 1790 Ma. These dates were "interpreted as the timing of closure of sphene to diffusion of radiogenic Pb after peak metamorphic conditions" (Chiarenzelli, 1989, p89). A mafic-ultramafic complex in the Daniels-'Tri'[1] Lakes

(1) Informal lake names appear in single quotation marks when first mentioned. The quote marks are dropped from all subsequent references to that lake.

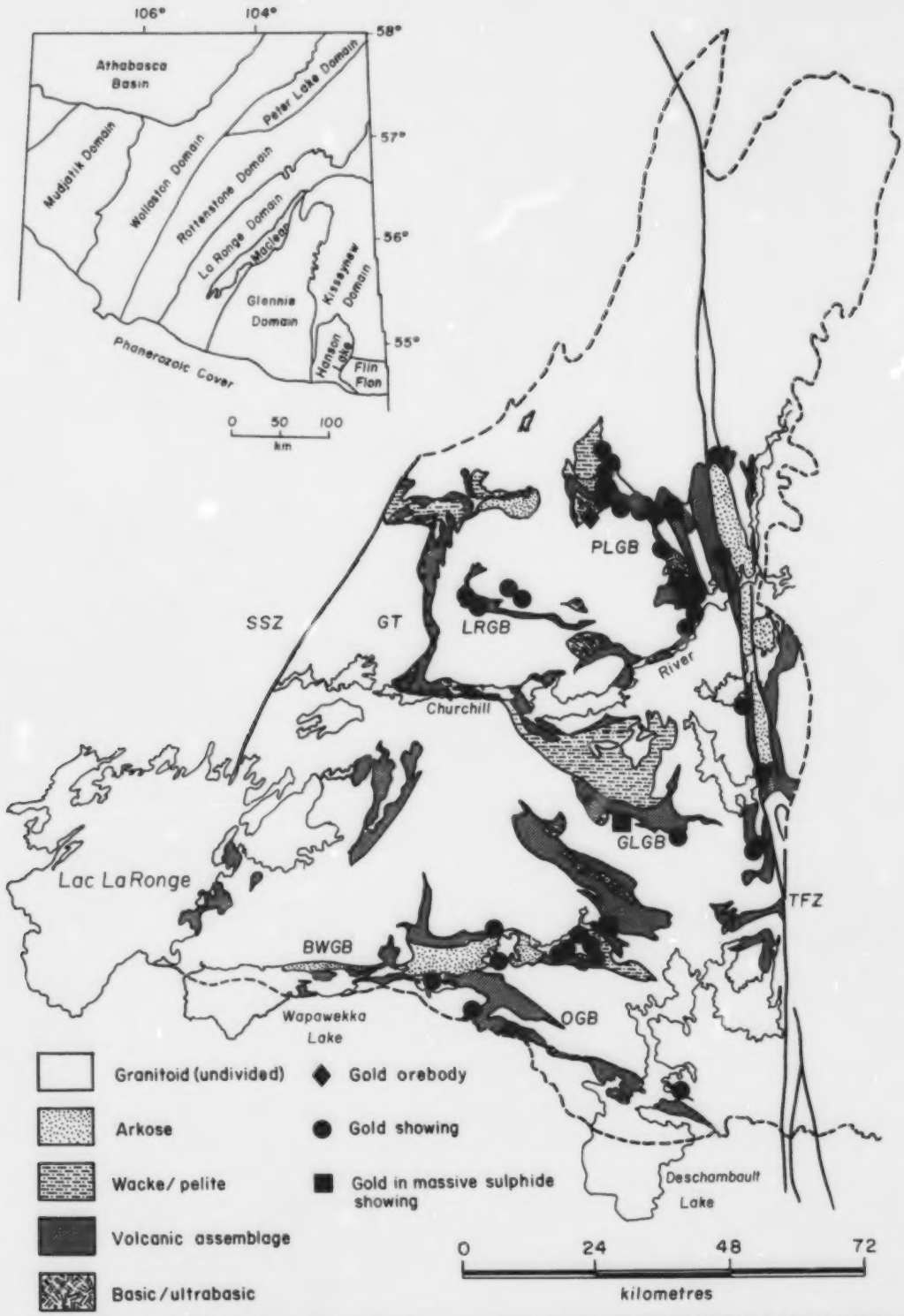

Figure 2 - Distribution of gold showings in the Glennie Domain in relation to supracrustal assemblages and basic intrusions. In areas where there is a high density of showings, individual dots represent more than one showing. GT = Guncoat Thrust; LRGB = Leland—Robinson Lakes Greenstone Belt; PLGB = Pine Lake Greenstone Belt; GLGB = Gee Lake Greenstone Belt; BWGB = Brownell—Wapawekka Lakes Greenstone Belt; OGB = Oskikebuk Greenstone Belt; TFZ = Tabbernor Fault Zone; and SSZ = Stanley Shear Zone. Inset map shows lithostructural domains in the southeastern part of the Precambrian Shield of Saskatchewan.

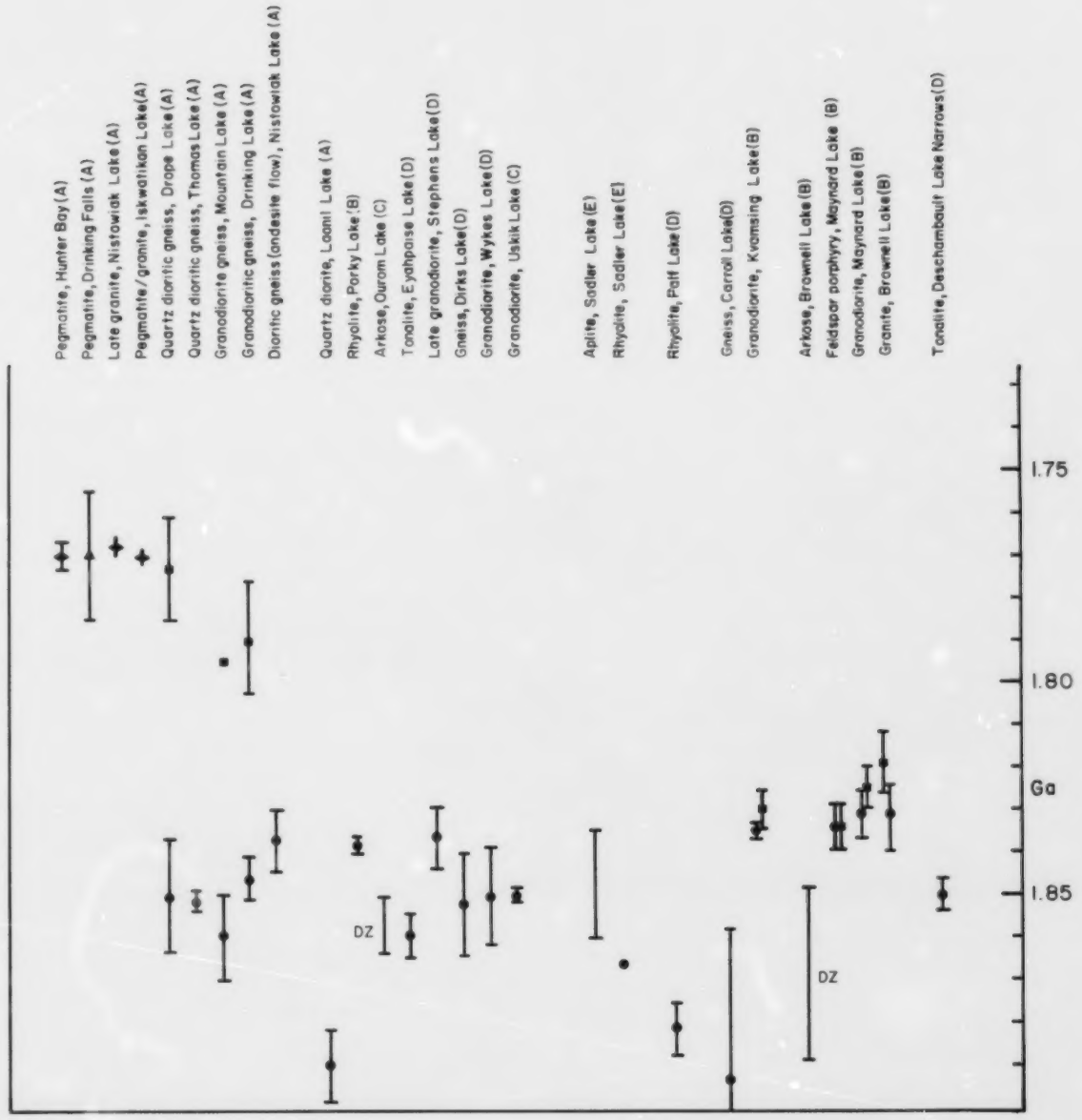

Figure 3 - Summary chart of Proterozoic U-Pb age determinations for the Glennie Domain. Symbols: diamond, monazite; square, sphene; triangle, allanite; circle, zircon; and DZ=detrital zircon. Bars on top and bottom of symbol show error range. Sources: A=Chiarenzelli (1989); B=McNicoll et al. (in press); C=Delaney et al. (1988); and D=Van Schmus et al. (1987).

area, west of Wood Lake, has a crystallization age of 1710 ±50 Ma determined from Nd-Sm isotopic systematics (Hulbert, 1989).

Much of the Glennie Domain was elevated to upper greenschist or lower amphibolite facies metamorphism. In the northern part of the domain the grade reached middle and upper amphibolite and rarely granulite facies (Figure 4; Rees, 1982; Lewry *et al.*, 1978).

Lewry (1981b) suggested that the Glennie Domain was a remnant Archean micro-continent that collided with the La Ronge Volcanic arc. Subsequent U-Pb dating (Bickford *et al.* 1987; Chiarenzelli, 1989) has revealed the presence of Archean age rocks in the Iskwatikin and Hunter Bay domes near the western margin of the Glennie Domain. As further detailed structural studies have been completed, the northern part of the domain has been interpreted to be a stack of southeastward-directed, refolded allochthonous thrust sheets formed during terminal collision in the Trans-Hudson Orogen (Lewry *et al.*, 1990).

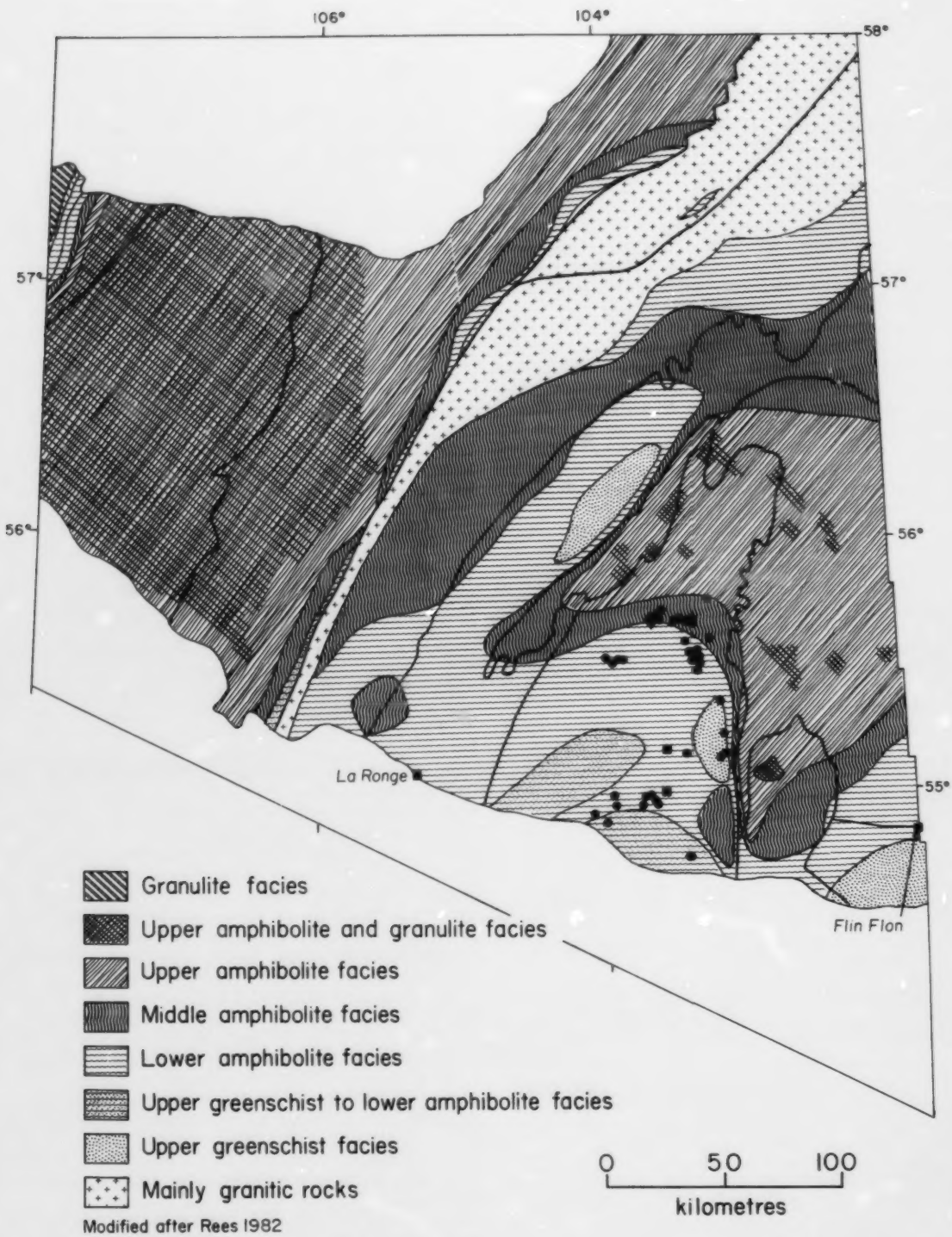

Figure 4 - Generalized metamorphic facies map of the southeastern part of the exposed Precambrian of Saskatchewan and distribution of gold occurrences in the Glennie Domain. Symbols are the same as for Figure 2 and heavy solid lines indicate boundaries of domains shown on inset diagram, Figure 2.

Gold Showings in the Glennie Domain

More than seventy occurrences of gold mineralization have been identified in the Glennie Domain. In most of these showings, gold occurs in structurally-hosted quartz veins, but it has also been found in sediment-hosted quartz veins, intrusive-hosted quartz veins, and associated with volcanogenic massive sulphides. As all known gold occurrences are found in or adjacent to greenstone belts (Figure 2), descriptions of the showings are grouped under the greenstone belts and are subdivided by geographic locality. Individual showings are described by name and under the headings of location, history and development, geological setting and characteristics of mineralization.

Some of the following descriptions derive from earlier workers (Satterly, 1932; Beck, 1959; Kirkland, 1976; Sibbald, 1978; Coombe, 1984), and some derive from the present author (Delaney, 1986, 1987, 1988, 1989). This information was updated and supplemented by field studies in 1990, by a review of information contained in the Mineral Assessment files of Saskatchewan Energy and Mines and by conversations with representatives of industry and academia.

In this report, the word 'orebody' is used to connote a concentration of minerals that are or could be mined at a profit at some point in time. The words 'occurrence', 'prospect' and 'showing' are used interchangeably and refer to a concentration of an economically valuable mineral commodity which, with further investigations, could become an orebody but in many other instances might prove to be nothing more than an anomalous concentration of the mineral.

Pine Lake Greenstone Belt

The Pine Lake Greenstone Belt (after the Pine Lake Metavolcanics of Lewry, 1977), the most extensive greenstone assemblage in the Glennie Domain (Figure 2), includes volcanic, volcaniclastic, sedimentary and intrusive rocks (both syn- and post-volcanic varieties) which have been variably deformed, metamorphosed, migmatized and granitized. The assemblage is preserved in two narrow, generally straight, locally-fragmented and wispily-terminated to locally-curvilinear belts that generally trend north-south. One of these belts extends from a wispily terminated tail north of 'Pigeon Lake' into the east-west-trending segment in the Laonil–Pine Lakes area and then southeast to Carruthers Lake, where it has been modified by a series of north-south-trending folds. It then passes south to Uskik Lake where it is bounded on the west by an irregular blob-shaped body of granitized and migmatized supracrustals. The main belt follows a southwest to west curvilinear trend along the Churchill River to the east end of Trade Lake where it bifurcates into two westward tapering arms. The other main remnant of the Pine Lake Greenstone Belt is a south-trending narrow belt that stretches from northwest of 'Trapp Lake' south to Deschambault Lake. In most of this latter area, the greenstone assemblage is flanked by, or contains, the trace of the Tabbernor Fault. Near the north end of this belt, on the north side of Pete Lake, there are wispily-terminated, northeast-trending fragments of greenstone. To the south, in the vicinity of Grassy Narrows, on the east side of Wood Lake, the greenstone belt is segmented by later granitoids.

Gold is found at several locations in the Pine Lake Greenstone Belt (Figure 2). The best known of these is the Seabee deposit at Laonil Lake. Several other gold showings are known in the Laonil Lake area as well as in the Pine Lake Greenstone Belt near Carruthers Lake, at Truscott Lake, Pete Lake, Eisler Lake, in the 'Georges'–Uskik Lakes area, at Manawan Lake, Wood Lake and Prongua Lake.

Truscott Lake

Information about the Island Showing is very preliminary as it was only discovered and investigated briefly in the fall of 1990.

Island Showing

Location: At the north end of the northernmost of the two large islands in the eastern arm of Truscott Lake (UTM co-ordinates 586950 m E, 6183450 m N).

History and Development: In the summer of 1965, W.G.Q. Johnston observed chalcopyrite in a "white pegmatite-like rock within biotite-feldspar-quartz gneisses near zones of dislocation: (a) on the south shore of the most northerly and almost completely enclosed bay in the east part of the unnamed lake (Truscott) east of Bailey Lake" (Johnston, 1968, p57). In October 1989, Corona Corporation registered claim S-100188 which covers the eastern half of Truscott Lake. In the fall of 1990, company prospectors collected 40 soil samples and 46 rock samples from two islands and part of the shore of the northern end of the east arm of Truscott Lake. This work delineated a north-trending gossan zone up to 15 m wide and 30 m long with anomalous gold values in a carbonatized felsic intrusive. Grab samples from the gossan contain pyrite, chalcopyrite, pyrrhotite and hematite. Two channel samples were taken across the gossan zone. One sample, over a width of 5.9 m, contained 146 ppb Au; a second sample, 15 m south of the first and over a width of 1 m, contained 957 ppb Au. Two grab samples from the area assayed 7.9 g/t (0.231 oz/ton) Au and 8.6 g/t (0.251 oz/ton) Au. Anomalous rock and soil samples were also collected approximately 0.5 km southwest of the Island Showing.

Geological Setting: Truscott Lake lies within NTS map sheet 63M-13 (Kelly Lake) which was mapped geologically by Johnston during the summers of 1964 and 1965 (Johnston, 1968). Truscott Lake is along the east limb of the Ray Lake Synform (Johnston, 1968; Lewry, 1977; Delaney, 1986) a major cylindrical asymmetric fold which plunges moderately to the north-northeast. The

area of the showing is underlain by a sequence of biotite gneiss, garnet-biotite gneiss and minor meta-arkose to which Johnston (1968) gave the temporary designation 'Bailey Lake Group' but which has been subsequently referred to as the 'Porky Lake Psammites' (Lewry, 1977) and the 'Porky Lake Siliciclastics' (Delaney, 1986). Further to the south, at Porky Lake, a high-strain zone is developed in the nose of the Ray Lake Synform at the contact between the Porky Lake Siliciclastics and the volcanics and volcaniclastics of the Pine Lake Metavolcanics (Lewry, 1977). Other gold showings occur in this high-strain zone along the east limb of the synform (see descriptions of the Pigeon Lake showings in this report).

Laonil Lake Area

Several gold showings have been discovered in the Laonil Lake area (Figure 5). The most important of these is the Seabee orebody at Laonil Lake. The Seabee property is surrounded by an 11,000 acre property (Figure 6) which was evaluated under the terms of a joint venture agreement between Currie Rose Resources Ltd. (40 percent) and Placer Dome Inc. (60 percent). Placer Development withdrew from its agreement with Currie Rose in late 1990. Extensions of Seabee mineralization have been discovered on both the northeast (the East Boundary Zone and Currie Rose Vein) and southwest sides (Vein 10 and Laonil Island) of the Seabee property. Gold-bearing quartz veins were recently discovered 2.5 km to the northeast of Seabee at the contact between sediments of the Pine Lake Metavolcanics and the Laonil Lake Intrusive Complex. The veins are on a small property held by the Pine Lake Joint Venture (Claude Resources 50 percent and Currie Rose Resources 50 percent).

Seabee Deposit

Location: On the peninsula at the northeast end of Laonil Lake (Figures 5 and 6; UTM co-ordinates 586500 m E; 6107135 m N).

History and Development: This property was staked by Cominco in 1947. Subsequently, during the period 1948 to 1950, Cominco completed several trenches and tested the property with 79 diamond drill holes. An additional two holes were drilled in 1960 (SEM Assessment File 63M12-0002) and a further 36 holes later on in order to evaluate the gold potential of the veins. Claude Resources purchased the property in 1984 and undertook additional drilling and estimated ore reserves. Claude announced proven and probable reserves for four veins (2, 5, 11 and 14) to a depth of 182 m of 561 548 tonnes of 11 g/t (0.32 oz/ton) Au cut (The Northern Miner, 1985). Possible reserves to a depth of 305 m were estimated to be an additional 454 000 tonnes grading 11 g/t (0.32 oz/ton) Au.

In 1985, Placer Development optioned the Seabee property from Claude Resources. By early 1987, Placer had completed an evaluation program which included 72 diamond drill holes, extensive overburden stripping of the vein system and detailed sampling and remapping of the property. Reserves to a depth of 366 m were estimated to be 1 982 240 tonnes at an average grade of 6.3 g/t (0.185 oz/ton) Au. This included 739 700 tonnes grading 12.5 g/t (0.364 oz/ton) Au (The Northern Miner, 1987a). Later in 1987, Placer completed an underground exploration program that included 900 m of underground development, bulk sampling and 6200 m of underground drilling. In 1988 Placer terminated its joint venture agreement with Claude. Near the end of 1988 Claude commissioned ACA Howe International Ltd. to complete an ore reserves study. This investigation concluded that the main zone, consisting of veins 2 and 5, contained proven and probable ore reserves of 585 135 tonnes grading 12.5 g/t and possible ore reserves of 332 937 tonnes grading 12.5 g/t Au. In late 1989, Claude engaged Cominco Engineering Services Limited (CESL) to undertake a $2-million program that included 3960 m of diamond drilling, 300 m of additional underground development and bulk sampling. On May 15, 1990, on the basis of the final feasibility study by CESL which reported reserves (all classes) of 1.04 million tonnes grading 13.7 g/t (0.4 oz/ton) Au, Claude announced a decision to proceed with production. Final environmental approval was received from the Government of Saskatchewan in January 1991. Mine construction, at an estimated cost of $22-million, included a 440 ton-per-day mill. Production began in November 1991. The mine is expected to have at least a five year life and an annual gold production of about 52,000 oz at a estimated cost of US $210 per oz (The Northern Miner, 1990, 1991; Whiteway, 1991). In March 1991, Claude announced the discovery of a new 152 m long zone of gold mineralization, the 161 Zone, located approximately 243 m south of Vein 2 and 213 m west of Vein 5 (Figure 6).

Geological Setting: Seabee ore is hosted in northeasterly-trending shear zones in the Laonil Lake Intrusive Complex (Lewry, 1977; Gummer, 1986; Delaney, 1986, 1990a; Kimura *et al.*, 1987) which has been dated at 1889 ±8.7 Ma (Chiarenzelli, 1989). In the vicinity of the veins, the Laonil Lake Intrusive Complex consists of a series of gabbroic layers or sheets cut and commonly capped by quartz diorite. Intrusion of quartz diorite was multi-phased. Layers, lenses, sills and dykes (locally known as 'green dykes') of melanocratic gabbro to ultramafic rock occur throughout this sequence. Variably thick layers, lenses and xenoliths of mafic metavolcanics, volcaniclastics and sediments are intercalated or rafted within this multiphase complex. 'Grey dikes', granodiorite and 'feldspar porphyry' are other minor intrusive phases that, in some cases, are economically important.

Characteristics of Mineralization: The following account is preliminary in nature. More details should be available upon completion of the investigations by Schultz (1990; Schultz and Kerrich, 1991a, b) who initiated a detailed study of the characteristics and controls of Seabee mineralization.

Ore is hosted in discontinuous quartz-tourmaline veins in a series of east-northeast-trending near-vertical shear zones. Within individual shears, which are up to 16 m wide and 200 m long, the main rock type is strongly

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2
3
4
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103°30'
55°45'
MUNRO
LAKE
PIGEON
LAKE
PINE
LAKE
PORKY
LAKE
SANTOY
LAKE
LAONIL
LAKE
PLn
PLr
PLrb
PLrbo
Pvb
Pvbo
Pvbp2
Pvao
Pvip
Pvic
Pve
Pvel
Pve4
Pve/Pvip/Gd
Pve/Pvi
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Gd2
Gd2a
Gd2b
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Figure 5 - Geological setting of gold showings in the northern part of the Pine Lake Greenstone Belt. Geology after Delaney (1986 and 1987). Names of showings, indicated by crossed geological hammers, are: 1=Seabee; 2=Currie Rose Vein; 3=Boundary Zone; 4=Laonil Island; 5=Northwest Laonil; 6=Pine Lake Joint Venture; 7=Santoy Lake—Zone 1; 8=Santoy Lake—Zone 2; 9=PL-1; 10=PL-2 (Zimmerman Showing); 11=P-1; 12=P-2; 13=P-3; 14=P-4; 15=Munro Lake; 16=Santoy Lake—Zone 3; and 17=Santoy Lake—Zone 4.

foliated gabbro, although both green and grey dykes are also abundant (*op cit.*; Kimura *et al.*, 1987). The veins are isoclinally folded along axes which plunge 80° to the west, parallel to a penetrative mineral lineation, but are elongated about axes plunging from 45° to 60° east. Structural relationships indicate that the gold-bearing quartz veins formed prior to the last major episode of movement in the shear zones. The orientation and apparent sense of movement on the shear zones is the same as that in the Laonil Lake Shear Zone at the southern margin of the Eyahpaise Lake Pluton.

Narrow sulphide-bearing feldspar porphyry bodies, within and adjacent to many of the shear zones, appear to be genetically associated with the quartz veins. Parts of some of these intrusions are auriferous, such as a porphyry on the north side of the No. 2 shear that contains 0.7 g/t (0.02 oz/ton) Au over 1.6 to 3 m widths (Gummer, 1986). The chemical characteristics of the 'feldspar porphyry' intrusions are identical to those of the Eyahpaise Lake Pluton.

Visible grains of gold are present in the quartz veins, but gold is more abundant in fine-grained pyrite and chalcopyrite. Other minerals in the veins include pyrrhotite, tourmaline, tellurides, magnetite, actinolite-tremolite, sericite, calcite, sphalerite, molybdenite and barite. In and adjacent to the shear zones, the alteration assemblage is chlorite-quartz-actinolite-pyrite and minor tourmaline; alteration/retrogression of metamorphic amphibole to biotite is common (Schultz and Kerrich, 1991b).

Stable isotope investigations of mineral separates from the gold-bearing quartz veins indicated ambient precipitation temperatures of 360° to 460°C (Schultz and Kerrich, 1991a). Isotopic compositions of fluid inclusions support derivation of fluids from metamorphic devolatilization (*ibid*).

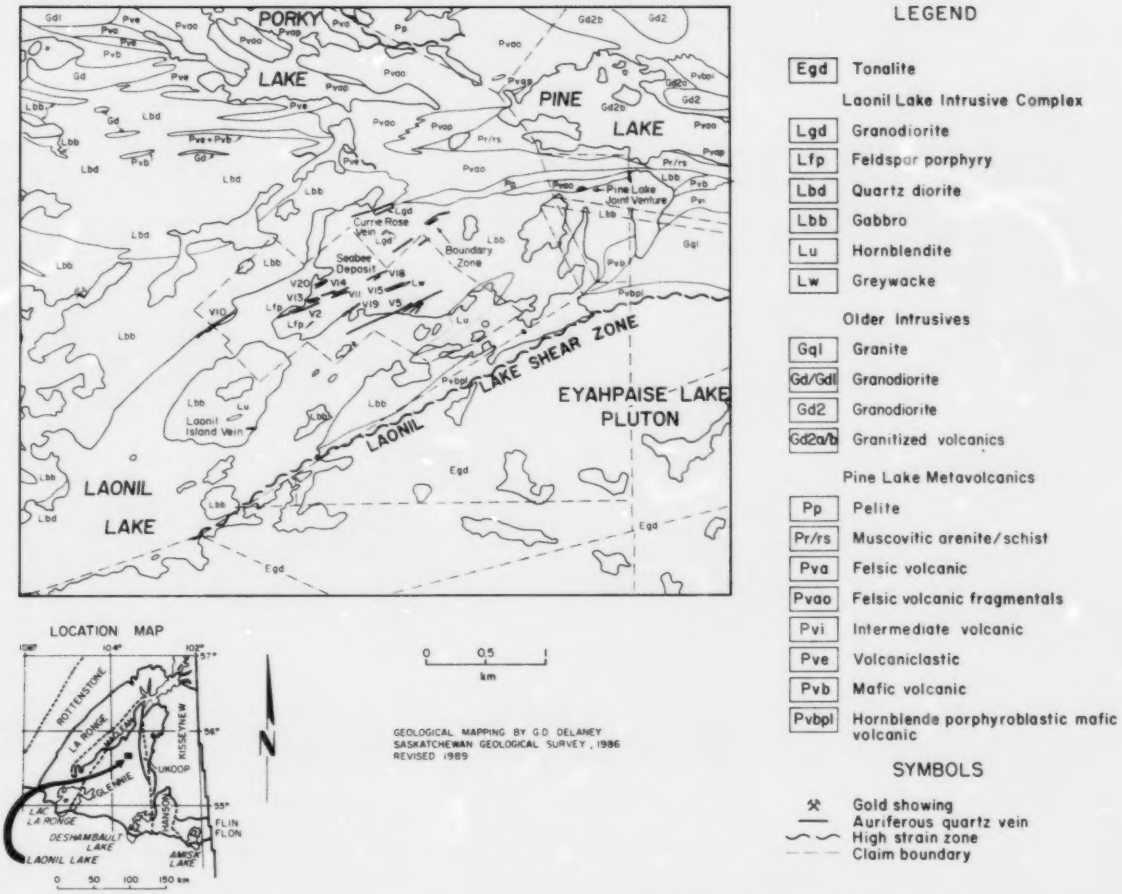


Figure 6 - The Seabee deposit and other gold showings in the Laonil Lake area.

Currie Rose Vein

Location: Near the northern margin of the Seabee claim block (Figure 6; UTM co-ordinates 587050 m E, 6172250 m N).

History and Development: Parts of this northeast-trending quartz vein system were stripped, mapped and channel sampled by Placer Dome Inc. during the summer of 1986. Channel samples contained spotty but significant gold values which were correlated with pyrite in the quartz veins. Three drill holes totalling 613 m revealed that the quartz veins thin at depth and contain sparse tourmaline, sulphides and significant gold mineralization (SEM Assessment File 63M12-0025; The Northern Miner, 1986a).

Geological Setting: At surface, veins are localized in a series of east-northeast-trending shear zones along both sides of an east-northeast-elongated narrow body of granodiorite that intruded a west-southwest-tapering lens of conglomerate and pelitic metasediments of the Pine Lake Metavolcanics within gabbro of the Laonil Lake Intrusive Complex (Figure 6; Delaney, 1986). Diamond drilling beneath surface exposures intersected shear zones at the contact between the Laonil Lake Intrusive Complex and the metasedimentary wedge, as well as in the intrusive complex.

Characteristics of Mineralization: The main vein, located on the northwest side of the granodiorite, ranges in thickness up to 5 m and is composed of milky quartz containing narrow zones of clotted fine-grained tourmaline aligned parallel to subparallel to the shear zone. Disseminated pyrite is rare. West-southwest of its widest extent, the main vein is segmented into a series of subparallel quartz-tourmaline veins within the shear zone.

Boundary Zone

Location: At the northeast boundary between the Seabee and Currie Rose claims (Figure 5; UTM co-ordinates 587460 m E, 6172170 m N).

History and Development: The zone was defined by an east- to northeasterly-trending, gold-in-soil geochemical anomaly as well as by ground geophysical anomalies in an area of known shear zones. It was investigated by Placer Dome Inc. in 1986. Stripping was followed by drilling five diamond drill holes totalling

819.8 m. Several zones containing gold mineralization were intersected (SEM Assessment File 63M12-0025), most notably: a 0.8 m intersection of 4.65 g/t (0.136 oz/ton) Au in CR-12; a 0.5 m intersection of 49.02 g/t (1.43 oz/ton) Au in CR-13; and a 1.2 m intersection of 6.2 g/t (0.182 oz/ton) Au in CR-14. Subsequently an additional 17 diamond drill holes were completed in this area, many of which intersected significant gold mineralization.

Geological Setting: The Boundary Zone is underlain by gabbro of the Laonil Lake Intrusive Complex as well as subordinate fine-grained amphibolite phases. These are intruded by younger granodiorite to diorite lenses together with felsic and mafic dykes. Some xenoliths of metasediments are found in this mixture of intrusive phases. The sequence is cut by a series of east-northeast-trending shear zones, many of which are associated with the mafic dyke swarms.

Characteristics of Mineralization: Quartz veins, pyrite, pyrrhotite, minor chalcopyrite and magnetite are reported to be erratically distributed throughout the shear zones (SEM Assessment File 63M12-0025). Alteration, including biotitization, silicification, sericitization, epidotization and minor carbonatization, has been observed in the shears.

Laonil Island Vein

Location: On the southeast side of the large island in Laonil Lake (Figure 6; UTM co-ordinates 585980 m E, 6170430 m N).

History and Development: This showing was discovered by Placer Dome Inc. during the summer of 1989. Later that year the showing was stripped, mapped in detail, sampled and tested by one diamond drill hole. No significant gold mineralization was discovered.

Geological Setting: The Laonil Island Showing is in gabbro of the Laonil Lake Intrusive Complex.

Characteristics of Mineralization: Near the shore of Laonil Lake, a quartz-tourmaline vein system up to 7.5 m wide is found within a shear zone in gabbro of the Laonil Lake Intrusive Complex. The shear zone trends 265° and is up to 15 m wide. Quartz veins, which are parallel to subparallel to the shear zone, pinch and swell along strike from a few millimetres to as much as 2.2 m in thickness. Fine- to medium-grained tourmaline is common in the veins. Patchy areas of coarse-grained hornblende and plagioclase are also found in the veins and sheared interleaved wall rocks. Other components of the veins are fragments of earlier quartz-tourmaline veins and lenses and tectonic rafts of sheared, leucocratic feldspar porphyry similar to that associated with mineralized quartz veins in Zone 2 of the Seabee Deposit. Approximately 40 m from the shoreline of Laonil Lake, the trend of the shear zone changes from 265° to 295°. The thickness of both the shear zone and quartz veins decreases significantly towards the west. Still farther west, the shear zone becomes more irregular in strike and appears to bifurcate.

Laonil Northwest

Location: On the northeast arm of the first lake northwest of Laonil Lake (No. 5 on Figure 5; UTM co-ordinates 584625 m E, 6171610 m N).

History and Development: The showing was discovered in the summer of 1981 by D. Partridge (SEM Assessment File 63M12-0010).

Geological Setting: The showing is in a buff-coloured felsic dyke associated with an apparently north-trending shear zone cutting medium-grained gabbro of the Laonil Lake Intrusive Complex.

Characteristics of Mineralization: The mineralized dyke is approximately 1.2 m wide and appears to trend southeasterly. Locally the dyke contains up to 10 percent pyrite, both as disseminations and in fractures. Grab samples are reported to contain 9.0 g/t (0.263 oz/ton) Au (SEM Assessment File 63M12-0010) and 8.4 g/t (0.246 oz/ton) Au (Currie Rose Newsletter, June 5, 1986).

Pine Lake Joint Venture Showing

Location: Approximately midway between the northeast arm of Laonil Lake and Pine Lake (Figures 5 and 6; UTM co-ordinates 588950 m E, 6172500 m N).

History and Development: In 1988, a single mineral claim (S-99942) was staked on behalf of Claude Resources (33 percent), Currie Rose Resources (33 percent) and Placer Dome Inc. (33 percent). Subsequently, in 1989, Placer Dome Inc., the operator of the joint venture, discovered gold bearing quartz veins. The showing is exposed in several stripped outcrops within an area 50 m east-west by 60 m north-south. There is evidence that several channel samples have been collected across the showing area but the results are not known. The showing has also been tested by four diamond drill holes and a bulk sample was taken during the summer of 1990. In 1991, Placer Dome dropped its interest in the property and this share was split equally between the two remaining partners.

Geological Setting: The mineralized veins are in a sequence of wackes, pelites and conglomerates of the Pine Lake Metavolcanics near the northeast contact of the Laonil Lake Intrusive Complex. The sequence has been subjected to at least three episodes of deformation but at this locality it is essentially homoclinal with tops (determined from cross laminations, grading and scour surfaces) to the north. Garnet is present in some beds and cordierite, aligned parallel to the D2 axial plane fabric, is common in the pelites.

Characteristics of Mineralization: As illustrated in the accompanying detailed map of part of the showing (Figure 7), quartz veins, which host the gold mineralization, occur in clusters of structurally attenuated, lenticular-shaped bodies which decrease in abundance to the north. Vein formation appears to have been early in the deformational history of the host rocks. The quartz veins contain patchy concentrations of pyrite, chalcopyrite

and visible gold. Some of the veins host or are locally mantled by clots of hornblende, epidote and minor sphene. Many quartz veins occur in fragmented patches of fine-grained black tourmaline. A grab sample, collected by the author, of a rusty-weathered part of one of the quartz veins contained 10.6 g/t (0.309 oz/ton) Au, 9.9 g/t (0.29 oz/ton) Ag and 0.48 percent Cu.

Porky Lake Area

There are two showings in the Porky Lake area: PL-1 and PL-2 (No. 9 and No. 10 respectively on Figure 5).

PL-1

Location: On the north side of the middle of three small lakes west of the south-central part of Porky Lake (No. 9

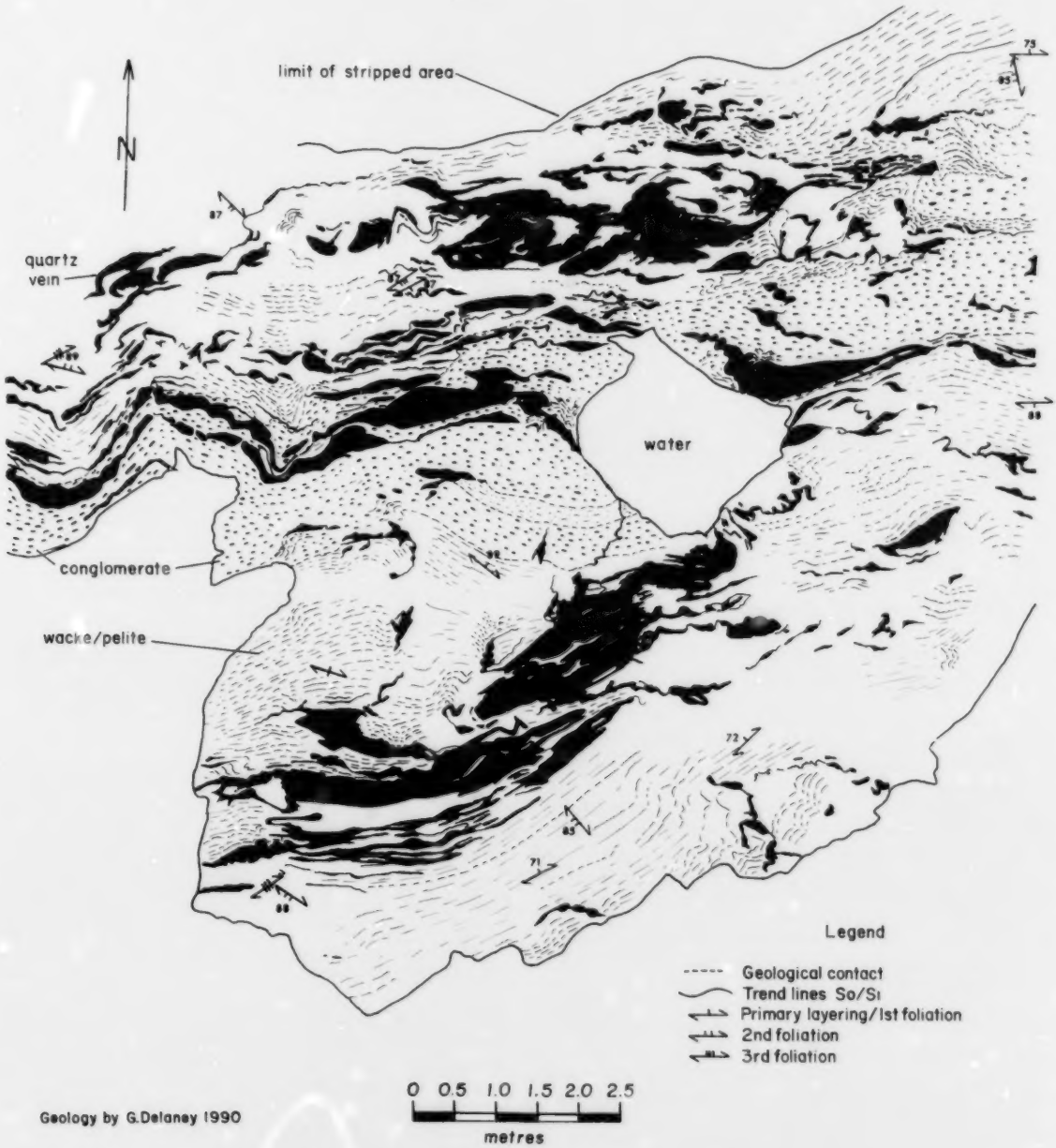


Figure 7 - Detailed map of a portion of the Pine Lake Joint Venture Showing.

on Figure 5; UTM co-ordinates 585200 m E, 6174500 m N).

History and Development: This showing was discovered during follow-up of an airborne INPUT anomaly identified in a survey flown over the Currie Rose property in 1981. The conductor was tested by two diamond drill holes. Diamond drill hole CR-6 intersected a 3.5 m thick brecciated volcanic unit containing up to 55 percent pyrrhotite as well as minor pyrite and chalcopyrite; hole CR-5 intersected a similar 10 m thick zone that averaged 30 to 40 percent pyrrhotite. The airborne electromagnetic conductor was attributed to these sulphides. Hole CR-6 also contained 3.9 g/t (0.115 oz/ton) Au in the interval between 31.8 and 32.1 m which was described as fine-grained, dark grey metavolcanic rock containing 1 percent disseminated, coarse arsenopyrite as well as minor pyrite and rare chalcopyrite (SEM Assessment File 63M12-0011). In 1986, Placer Dome Inc. completed geological mapping, detailed soil sampling and ground VLF-EM and magnetometer surveys in the Porky Lake Area.

Geological Setting: The area is underlain by strongly lineated mafic volcanics and volcaniclastics of the Pine Lake Metavolcanics that are locally carbonate-bearing.

PL-2 (Zimmerman–1984 Showing)

Location: On the shoreline of a bay in the east-central part of Porky Lake (No. 10 on Figure 5; UTM co-ordinates 586650 m E, 6174200 m N).

History and Development: This showing was discovered by J. Zimmerman in 1984. A grab sample yielding 1.4 g/t (0.04 oz/ton) Au was collected from this locality. No other information is known about this occurrence.

Geological Setting: Mineralization is reported to occur in a northeast-trending shear zone at the contact between a calc-silicate-bearing volcanic rock and a hybrid unit of metavolcaniclastics and granodiorite (SEM Assessment File 63M12-0025).

Pigeon Lake

Four gold showings are reported from the shores of Pigeon Lake (SEM Assessment File 63M12-0011; Coombe, 1984). As the history and development of these showings is inter-related these topics are grouped and are followed by descriptions of the individual showings.

History and Development: The Pigeon Lake area was staked by E.F. Partridge in 1972 for the Husky consortium; previously, in the late 1960s, Partridge had found at least one gold showing (P4 in the discussion below) on the west shore of Pigeon Lake. In late 1980, Currie Rose Resources optioned CBS 7075, CBS 7076, CBS 7057 and CBS 7058 encompassing the Laonil-Pine-Munro-Pigeon-Porky Lakes area. In May 1981, Currie Rose Resources completed airborne electromagnetic and magnetic surveys which identified four major conductors. The property was subsequently prospected (SEM Assessment File 63M12-0010). In July 1981, the Saskatchewan Mining and Development Corporation (SMDC) obtained a 50 percent share in the property under the terms of the Crown Participation Program. Various showings on the Currie Rose property were tested by eight diamond drill holes in 1984 (SEM Assessment File 63M12-0011). In 1986, Placer Dome Inc. completed detailed soil sampling, geological mapping and ground geophysical surveys in the Pigeon Lake area and, during the period 1986 to 1990, drilled five diamond drill holes totalling 806 m. The results of this work are still confidential.

P-1

Location: On the prominent peninsula near the northeast end of the lake (No. 11 on Figure 5; UTM coordinates 588500 m E, 6177150 m N).

Geological Setting: A trenched gossan zone in an outcrop of mafic volcanics is cut by an irregular system of iron sulphide-bearing calcareous veinlets and quartz veins.

Characteristics of Mineralization: A grab sample from the showing yielded 12.5 g/t (0.365 oz/ton) Au, 25.0 g/t (0.736 oz/ton) Ag and 0.61 percent Cu (SEM Assessment File 63M12-0010). Two 100 m drill holes (CR-1 and 2) which tested this mineralized zone failed to encounter any ore grade intersections of gold (SEM Assessment File 63M12-0011).

P-2

Location: At the northwest end of Pigeon Lake (No. 12 on Figure 5; UTM co-ordinates 588100 m E, 6177425 m N).

Geological Setting: The showing is on the eastern limb of the Ray Lake Synform near a sheared contact between arkoses of the Porky Lake Siliciclastics and volcanics and volcaniclastics of the Pine Lake Metavolcanics.

Characteristics of Mineralization: A grab sample yielded 1.7 g/t (0.05 oz/ton) Au but there is no additional information.

P-3

Location: On the west side of Pigeon Lake (No. 13 on Figure 5; UTM co-ordinates 588100 m E, 6177425 m N).

Geological Setting: This showing, like P-1, is on the eastern limb of the Ray Lake Synform, near a sheared contact between muscovite-bearing feldspathic arenites of the Porky Lake Siliciclastics and volcanics of the Pine Lake Metavolcanics.

Characteristics of Mineralization: This is a surface showing from which a grab sample yielded 2.7 g/t (0.08 oz/ton) Au but no further details are known. A southeasterly-inclined 101 m long drill hole (CR-3) was collared at this site. Examination of the core on site

revealed that the hole intersected approximately 25 m of banded and disseminated iron sulphides in a sequence of dark greenish-grey garnetiferous volcaniclastics. Assays of a number of samples from this interval returned no gold and only trace amounts of copper and nickel (SEM Assessment File 63M12-0011).

P-4

Location: On the peninsula near the southwest end of Pigeon Lake (No. 14 on Figure 5; UTM co-ordinates 587480 m E, 6176425 m N).

Geological Setting: The showing is at a similar stratigraphic position as P-2 and P-3.

Characteristics of Mineralization: The showing is reported to consist of a 6 m wide zone of pyritic quartz veinlets in dark mica schist. A grab sample collected by D. Partridge in 1981 yielded 12.8 g/t (0.373 oz/ton) Au (SEM Assessment File 63M12-0010); another sample collected from an old trench yielded 12.0 g/t (0.349 oz/ton) Au (Coombe, 1984). A 101 m diamond drill hole (CR-4), drilled to the southeast, failed to intersect any significant gold mineralization (SEM Assessment File 63M12-0011).

Munro Lake Area

The discovery of this showing was announced only recently so information is sparse. The following information was supplied by R. Walker of Shane Resources and G. Wong of Placer Dome Inc.

Munro Lake—Trench M-7

Location: The showing is west of the main circuitous arm at the south end of Munro Lake approximately half way to the small lake on the portage route to Pine Lake (Figure 4; UTM co-ordinates 591510 m E, 6171810 m N).

History and Development: The first recorded work in this area was in 1957 and 1958 when E.L. Morley completed 10 trenches on gossan zones in calc-silicate (unit Pvec; Delaney, 1987) exposed along lakeshore at the south end of Munro Lake (SEM Assessment File 63M12-0004 and -0009). In 1986, Shane Resources acquired an option on CBS 7579 which covers ground at the south end of Munro Lake. Later in 1986, Shane commissioned Walker Exploration Ltd. to undertake a ground magnetometer/gradiometer and VLF-EM survey over a grid which had been cut previously on the property (SEM Assessment File 63M12-0022). The surveys outlined nine areas for follow-up (SEM Assessment File 63M12-0022). In 1987, Placer Dome Inc. optioned the property from Shane Resources and completed geological mapping and a detailed soil geochemical survey. The results of this work are still confidential. Also, during the late 1980s, Placer Dome Inc. undertook a detailed study of gold grain dispersion patterns based on bulk till sampling of an extensive area south and east of Laonil Lake. This work defined several gold grain dispersion anomalies over the north end of the Eyahpaise Lake Pluton (Currie Rose Resources Inc., Compilation Map, 1990). In 1990, tracing of one of these anomalies up-ice, coupled with the results of previous geological investigations and new outcrops exposed by a recent forest fire, resulted in the discovery of the showing. In late 1990, Placer Dome Inc. terminated its option agreement with Shane Resources.

Geological Setting: The showing consists of pyritic quartz veins in a shear zone at the east-southeast-trending contact between mafic to intermediate volcanics of the Pine Lake Metavolcanics and leucocratic granite (unit Gq1; Figure 5). The quartz veins and shear zone pinch and swell along strike. A grab sample from a loose piece of quartz on the vein yielded 48.6 g/t (1.42 oz/ton) Au and a channel sample from the quartz vein contained 13.87 g/t (0.405 oz/ton) Au. (G. Wong, Placer Dome Inc., pers. comm., 1991).

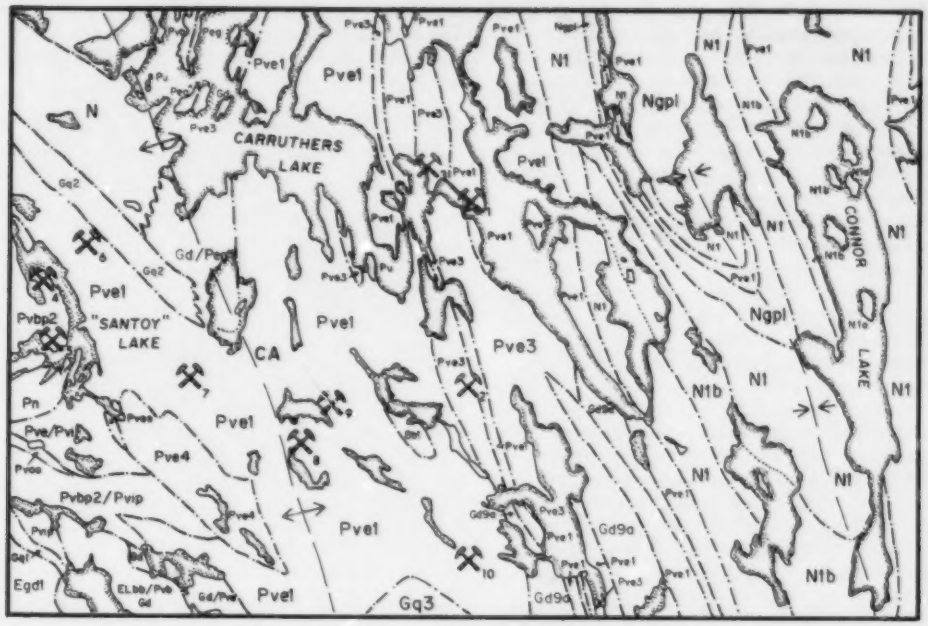
'Santoy Lake' Area

Santoy Lake

Information about the character of these showings is preliminary as their discovery has only recently been announced. Much of the following description is based on information supplied by P. Gummer and S. McGowan of Claude Resources, supplemented by a property inspection by the author during the summer of 1991.

Location: Seven areas of gold mineralization have been identified. These locations are shown on Figure 8 (UTM co-ordinates are: Zone 1—595270 m E, 6172320 m N; Zone 2—595350 m E, 6171650 m N; Zone 3—595560 m E, 6172600 m N; Zone 4—596780 m E, 6171380 m N; Zone 6—597900 m E, 6170700 m N; Zone 7—598200 m E, 6171085 m N; and Zone 8—599560 m E, 6169510 m N).

History and Development: The area was originally included within MPP 1113 acquired by SMDC in 1980. Subsequently, Claude Resources optioned the permit and subdivided it into several smaller claim blocks. One of these blocks, CBS 7588, was optioned to Kenton Natural Resources who in turn optioned it to Manchester Oil and Gas. During the winter of 1988-89, Manchester cut a grid and completed a geophysical survey on the southern and western parts of CBS 7588. Much of the grid was subsequently destroyed by forest fires during the summer of 1989. In 1990, Claude Resources and Manchester Resources entered into a joint venture agreement to evaluate the potential of a group of claims (including S-100748, S-101660 and S-101689) held by these companies in the vicinity of Santoy Lake and encompassing much of former CBS 7588. As a result of prospecting (including stripping and trenching) during the summer of 1990, three mineralized zones were identified. In December of 1990, the partners announced the discovery of two zones containing gold mineralization in quartz carbonate veins in sheared metavolcanics within a multi-phased fold structure. Visible gold was observed in association with pyrite and chalcopyrite; grab samples assayed up to 4.9 oz/ton Au. (George Cross Newsletter, No. 239, Dec. 11,



LEGEND

Peg Pegmatite

EYAHPAISE LAKE PLUTON

Egd1 Quartz diorite

Gq1 Granite

Gq2 Leucocratic granite

Gq3 Granite

Gd Granodiorite

Gd9a Granitized sediments

N Paragneiss

N1 Tonalitic gneiss

N1a Plagioclase blastic migmatite

N1b Garnetiferous metasediments

Ngpl Migmatitic schist

Trace of synform axis

Trace of antiform axis

PINE LAKE METAVOLCANICS

Pvao Conglomerate

Pve Volcaniclastics/sediments

Pve1 Volcaniclastics/sediments

Pve3 Arkose/biotite schist/gneiss

Pve4 Siltites/volcaniclastics

Pn Biotitic schist

Pvi Intermediate volcanics

Pvip Blastic intermediate volcanics

Pu Ultramafic

Bb1 Gabbro

Pvb Mafic volcanics

Pvbp2 Blastic mafic volcanics

EISLER LAKE INTRUSION

ELbb Gabbro

Geological boundary

Figure 8 - Geological setting of gold showings in the Carruthers Lake area. Geology after Delaney (1987). Names of showings, indicated by crossed hammers, are: 1=Carr; 2=Erna; 3=R.J.; 4=Santoy Lake—Zone 1; 5=Santoy Lake—Zone 2; 6=Santoy Lake—Zone 3; 7=Santoy Lake—Zone 4; 8=Santoy Lake—Zone 6; 9=Santoy Lake—Zone 7; and 10=Santoy Lake—Zone 8. CA=Carruthers Lake Antiform.

1990). A follow-up program, during the summer of 1991, included prospecting, sampling, sluicing and trenching of the showings as well as regional and detailed mapping. This work resulted in the discovery of four new mineralized zones as well as other gold showings. In an October 30, 1991 news release, the partners reported significant assay results for some of the trenched areas. For Zone 2, a 636 kg (1400 lb) bulk sample collected along 183 m with an average width of 3.6 m had an average grade of 17.5 g/t (0.51 oz/ton) Au including a 8.23 m wide folded zone averaging 19.2 g/t (0.56 oz/ton) Au. Zone 6, from which a 273 kg (670 pound) bulk sample from four trenches was extracted, along 158.5 m with an average width of 3.5 m, had an average grade of 16.4 g/t (0.48 oz/ton) Au including a 3.35 m wide interval with an average grade of 31.2 g/t (0.91 oz/ton) Au.

Geological Setting: The showings are hosted in a sequence of variably migmatized quartz-feldspar siltites, arkoses, conglomerates, volcaniclastics, volcanic fragmentals, pelitic sediments and plagioclase blastic intermediate to mafic volcanics. These rocks, part of the Pine Lake Metavolcanics, have been subjected to multiple deformation events. The dominant megascopic structures are large-scale north-northwest-trending folds including the Carruthers Lake antiform and an unnamed synform—the axial trace of which is along the west side of Santoy Lake (Figure 8; Budding and Kirkland, 1956; Delaney, 1986, 1987). Narrow high-strain zones are developed along the limbs of these structures particularly in zones of lithologic heterogeneity.

Characteristics of Mineralization: The following account is based on preliminary reports provided by Claude Resources.

Zone 1 - This showing, at the north end of the peninsula on Santoy Lake (No. 7 on Figure 5), is characterized by visible gold in a large quartz injection in a sequence of hornblendic sediments or volcaniclastics flanked by arkose. The quartz veining is in the closure of a north-northwest-trending fold. Three samples from a large 2 m wide channel sample contained from 67.4 to 168 g/t (1.968 to 4.906 oz/ton) Au.

Zone 2 - Stripping at the south end of the peninsula (No. 16 on Figure 5) has uncovered a 2 to 3 m wide folded quartz vein, at least 200 m long, in a sheared amphibolite and feldspar gneiss sequence flanked by arkose. Chalcopyrite, pyrite, galena and arsenopyrite as well as visible gold occur in the quartz vein. Grab samples yielded up to 121.2 g/t (3.54 oz/ton) Au; trenching results are presented in the history and development section of the property description.

Zone 3 - On the northeast side of Santoy Lake (No. 8 on Figure 5) gold mineralization is hosted in folded quartz veins in a banded gneiss sequence in a southeast-trending shear zone that ranges from 2 to 5 m wide and has been traced for approximately 700 m. The gneiss sequence includes quartz, chlorite, amphibolite and quartzofeldspathic bands. There is a garnetiferous gneiss along the eastern side of the mineralized zone. Clots and disseminations of pyrite and chalcopyrite occur in both the shear zone and quartz veins. The best grab sample assayed 4.6 g/t (0.135 oz/ton) Au; a 3 m wide bulk sample of this zone had an average grade of 3.71 g/t (0.108 oz/ton) Au.

Zone 4 - Gold mineralization occurs in quartz veinlets in a 25 m wide northwest-trending sheared arkose that dips steeply to the west and is flanked on both sides by amphibolite-feldspar-biotite gneiss. The mineralized zone, which has a strike length of 100 m, contains as much as 2 percent pyrite and trace amounts of arsenopyrite and chalcopyrite as well as malachite. A single bulk sample collected over a width of 5 m has an average grade of 3.05 g/t (0.089 oz/ton) Au.

Zone 6 - Gold occurs in a mineralized zone up to 6 m wide and at least 300 m long that is characterized by quartz veins in arkose with brittle-ductile high-strain zones. The mineralized arkose, which strikes north and dips moderately to the east, is interpreted to be on the western limb of a fold. On the west side of the mineralized zone is a sequence of amphibole-feldspar-sericite-chlorite gneiss and chlorite schist; on the east side is medium-grained amphibole gneiss and medium-grained amphibole-feldspar gneiss. Visible gold as well as pyrite and minor chalcopyrite and malachite occur in the mineralized zone. Assay results are reported in the section on history and development.

Zone 7 - Gold mineralization occurs in a 6.6 m wide sequence of arkose containing abundant quartz veins. There is as much as 7 percent pyrite and trace amounts of chalcopyrite in the mineralized zone. This unit, which trends northwesterly and dips moderately to the east, has been traced for 400 m along strike. A bulk sample taken over a width of 2.8 m has an average grade of 7.17 g/t (0.209 oz/ton) Au.

Zone 8 - Gold mineralization occurs in a 5 to 23 m wide zone of brittle deformation containing quartz veins in a north- to northwest-trending arkosic unit that dips moderately to the east. This zone has been traced for 380 m. Mineralized arkose is flanked by an assemblage of amphibole-feldspar gneiss, amphibole-feldspar-biotite-chlorite-sericite gneiss and arkose. Visible gold as well as chalcopyrite, pyrite and malachite occur in the mineralized zone. One bulk sample, from a width of 4.4 m, has an average grade of 7.73 g/t (0.226 oz/ton) Au; another bulk sample, collected across 4 m of the vein, has an average grade of 9.19 g/t (0.269 oz/ton) Au.

Carruthers Lake Area

Three gold showings named Carr/Car1, R.J. and Erna (Figure 8) have been discovered in the Carruthers Lake area.

Carr/Car1

Location: On north shore of the peninsula at the east end of the narrows near the middle of Carruthers Lake (No. 1 on Figure 8; UTM co-ordinates 599600 m E, 6173100 m N).

History and Development: J. Studer staked this prospect in 1965 and dug six pits (SEM Assessment File 63M11-0007). In 1968, Great Plains Development Ltd. optioned the ground and included it in a detailed geological and geophysical investigation of the Carruthers Lake area. They reported that grab samples collected by J. Studer contained up to 2 percent Cu, 20.5 g/t (0.6 oz/ton) Au and 24.0 g/t (0.7 oz/ton) Ag. (SEM Assessment File 63M11-0016). Claude Resources staked CBS 7584, which includes the Carr Showing, when MPP 1113 was converted to claim blocks. Subsequently, in 1986, Dundee Resources earned a 60 percent interest in the claim block when it contracted Taiga Consultants Limited to cut a grid and complete a VLF-EM and magnetometer survey, as well as geological mapping and B-horizon soil sampling in the vicinity of the Carr Showing (SEM Assessment File 63M11-0047). The magnetic survey defined magnetic highs corresponding to lean iron formation; there was no VLF-EM expression of the showing. The showing was sluiced, mapped in detail and chip sampled. Further prospecting and ground geophysical work was completed over the area northwest of the Carr Showing in 1987 and 1988 (SEM Assessment File 63M11-0053).

Geological Setting: The showing is hosted in a thin-bedded, strongly-foliated sequence of dark green, grey or light grey weathering, pyrrhotite-bearing, fine-grained biotite-hornblende metavolcaniclastic and metasedimentary rocks that contain narrow shear zones.

Characteristics of Mineralization: Sulphide-rich layers in calc-silicates form a zone as much as 12 m in width (SEM Assessment File 63M11-0047). The nature of the sulphides is illustrated at one well exposed area observed by the author where, over an interval of approximately 5 m, five rusty-weathering calc-silicate beds contain visible disseminated pyrrhotite. Individual beds range in thickness up to 0.5 m and extend for at least 30 m along strike to the north. During investigations in 1986, Taiga Resources collected 24 chip samples across the Carr Showing; the best gold value was 86 ppb from a weathered shear zone. One sample collected by the author from a pyrrhotitic-rich horizon contained 43 ppb Au and was also anomalous in copper (266 ppm), nickel (137 ppm) and manganese (515 ppm).

Erna

Location: Approximately 1.6 km south of Carr/Car 1 (No. 2 on Figure 8; UTM co-ordinates 599550 m E, 6171400 m N).

History and Development: The first work reported in this area was by Hudson Bay Mining and Smelting who in 1957 completed a geophysical survey and eight trenches over a showing covered by the TOY and SITKA claims. In 1968, Great Plains Oil and Gas Ltd. staked a large area (CBS 1401 and 1406) that included the Erna Showing. Investigations included trenching, detailed mapping, geophysical surveys and diamond drilling (Figure 9). The best grab sample from the showing contained 4.8 g/t (0.14 oz/ton) Au, 68.5 g/t (2.8 oz/ton) Ag, 8.32 percent copper and 0.36 percent zinc. Five short drill holes at four locations tested the showing and returned up to 0.29 percent copper, 3.5 g/t (0.1 oz/ton) Ag and values of less than 0.4 g/t (0.01 oz/ton) Au (SEM Assessment File 63M11-0016). Claude Resources staked CBS 7584 which includes the Erna Showing, when MPP 1113 was converted to claim blocks. Subsequently in 1986, Dundee Resources earned a 60 percent interest in the claim block when it contracted Taiga Consultants Limited to cut a grid, complete a ground VLF-EM and magnetometer survey, as well as geological mapping, and B-horizon soil sampling in the vicinity of the Erna Showing (SEM Assessment File 63M11-0047). The geophysical surveys defined a weak magnetic high and weak VLF-EM conductor over the showing. Detailed remapping and resampling of the Erna Showing revealed that gold values show a direct relationship with chalcopyrite content; the best gold values were from three samples CR-114, -115 and -116 collected from Trench No. 1 which assayed 174, 1940 and 216 ppb Au respectively. Sample CR-115 was collected from a chalcopyrite-rich vein near the center of the trench. Soil sampling in the vicinity of the Erna grid identified a number of anomalous areas which warrant further investigation. Additional prospecting of the Erna Showing was completed in 1988; one sample from a narrow (<30 cm) mineralized zone assayed 6.8 g/t (0.198 oz/ton) Au, 3.67 percent Cu, 0.21 percent Zn and 3.67 oz/ton Ag (SEM Assessment File 63M11-0053).

Geological Setting: The Erna Showing is in a thick, north-trending belt of volcanics, volcaniclastics and sediments of the Pine Lake Metavolcanics. In the vicinity of the showing, Delaney (1987; in prep.) divided this sequence into two units. The first subdivision unit (Pve1), is predominantly a dark greenish-grey to light-grey weathering, fine-grained, compositionally layered rock composed of various proportions of biotite, hornblende, quartz and plagioclase. Garnet porphyroblasts are ubiquitous in the northern part of the Carruthers Lake area; rare garnetiferous horizons on the west side of the narrows in Carruthers Lake, composed of 60 to 70 percent garnet and containing up to 26.3 wt percent Fe_2O_3 are considered to be iron formation. Subordinate rock types in this unit include hornblende plagioclase gneiss and homogeneous mesocratic to melanocratic hornblende granulite. The other subdivision, unit Pve3, includes the following rock types: 1) strongly foliated, buff weathering meta-arkose that ranges from varieties containing only a few percent micaceous minerals to those with more abundant muscovite, biotite, hornblende and porphyroblasts of garnet; 2) brownish-grey weathering biotite schist typically with porphyroblasts of garnet; 3) light-grey weathering leucocratic granodiorite to granodiorite gneiss; 4) compositionally-layered, fine-grained hornblende-biotite-quartz-feldspar rock similar to unit Pve1 but not abundant enough to map as a separate unit at this scale of mapping. Within this sequence are north-south-trending high-strain zones.

Characteristics of Mineralization: Great Plains Development reported that the prospect is hosted in a dextral fault zone that trends 340° and cuts a sequence of cordierite-garnet-actinolite-biotite gneiss and garnet-biotite gneiss (Figure 9; SEM Assessment File 63M11-0016). Within the fault zone, chalcopyrite is present in narrow veins as well as in stringers, blebs and dissemi-

nations over widths ranging from 0.3 to 1.2 m. A 1100 m long gossan delineates the mineralized zone. During a subsequent investigation by Taiga Resources, the gold mineralization was interpreted to be stratiform in coarse-grained actinolite-cordierite schist rather than in a dextral shear zone as reported in the earlier Great Plains work (SEM Assessment File 63M11-0047).

R.J.

Location: On the north shore and near the mid-point of the circuitous narrows connecting the two main parts of Carruthers Lake (No. 3 on Figure 8; UTM co-ordinates 598960 m E, 6173600 m N).

History and Development: Prospectors investigating a gossan on the north side of Carruthers Lake collected two samples which assayed 1.15 percent and 1.29 percent Cu, 300 and 345 ppb Au and 28.1 and 27.7 ppm Ag (SEM Assessment File 63M11-0053).

Geological Setting: The gossan zone, which is at least 50 m wide along the north side of Carruthers Lake, is developed over a strongly foliated, bleached-looking sequence of garnet, hornblende, muscovite and

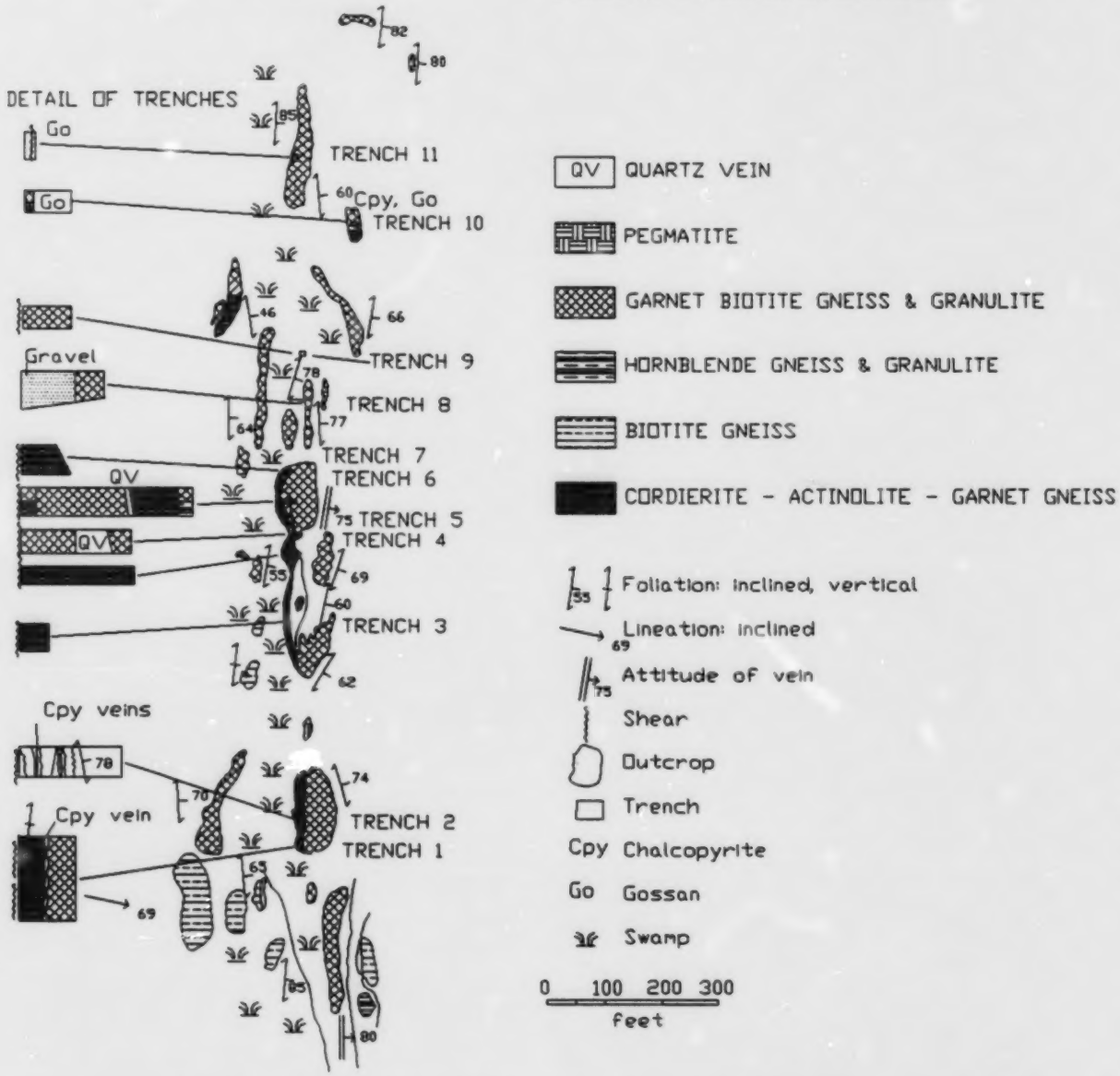


Figure 9 - Trench map of the Ema Showing (from SEM Assessment File 63M11-0016).

plagioclase and narrow quartz pods. The showing is hosted in a sequence of volcanics, volcaniclastics and sediments of Pine Lake Metavolcanics. Two main subdivisions were distinguished in the area of the showings: Pve1 and Pve2, these are described in more detail in the geological setting of the Erna Showing.

Pete Lake Area

Pete Lake/Peggi Lynn/Bur, Bornite and Tree Claims

Location: On the north shore of Pete Lake (Figure 10; UTM co-ordinates 610300 m E, 6118000 m N).

History and Development: Work prior to 1956 included: 1) a limited electromagnetic survey and three diamond drill holes by Exploration Projects Ltd. but nothing significant was intersected in the holes; 2) Hudson Bay Exploration and Development Ltd. completed a limited electromagnetic survey but no significant conductors were identified; and 3) a magnetometer survey (SEM Assessment File 63M11-0030). A segment of the Mansa airborne electromagnetic survey for the Pete Lake area (SEM Assessment File 63M11-0006) was made available to B. Richards, the claim owner in 1957. This survey identified a conductor over the southwest end of Pete Lake. H.D. Carlson reported that, near the center of the northwest shore of Pete Lake, a pit in an outcrop of amphibolite exposed a 1.2 m wide shear zone, trending 070° and dipping 50° south, containing bornite and minor chalcopyrite and pyrite. A 1.2 m wide channel sample, collected in 1956, assayed 9.05 percent Cu, 0.2 g/t (0.06 oz/ton) Au and 0.7 g/t (0.2 oz/ton) Ag (SEM Assessment File 63M11-0030). Carlson also noted that, at a number of localities in this area, pyrite and minor chalcopyrite occur in silicified shear zones cutting hornblende-feldspar granulites and gneisses. In 1969 Carlson, on behalf of New Brunswick Metals and Mining Limited, completed magnetometer and VLF-EM surveys over claim block CBS 1053 which encompasses the Pete Lake area. Eleven diamond drill holes were collared to test six northeast-trending EM conductors defined by the survey (Figure 10). Of the two conductors in the vicinity of the showing, one was tested by three drill holes (DDH 1 to 3) and contained narrow intersections of massive to disseminated chalcopyrite with minor pyrite; the other conductor was tested by two drill holes (DDH 4 and 5) and consisted of tiny pyrite stringers and trace amounts of chalcopyrite. The other four conductors were drilled and returned

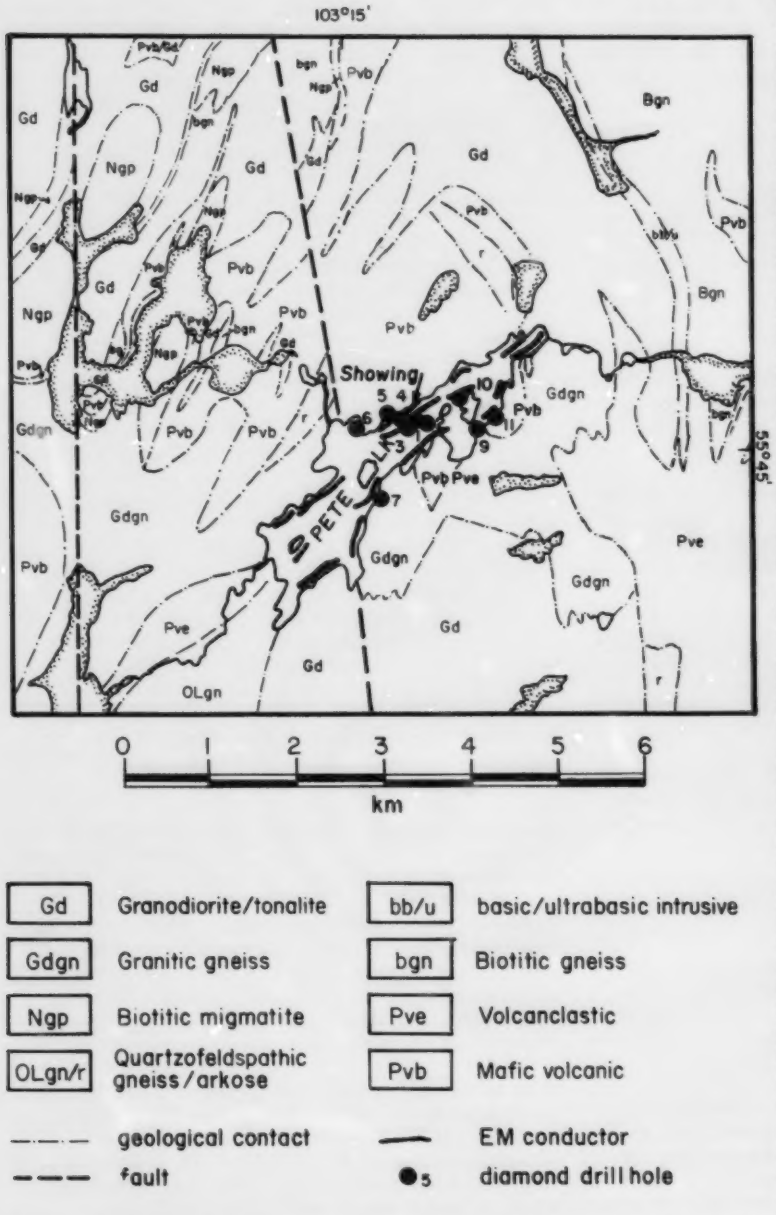


Figure 10 - Geological sketch map of the Pete Lake area including the location of EM conductors and diamond drill holes. Geology after Budding and Kirkland (1956), Scott (1982), Johnston (1984) and Delaney (1987).

similar intersections (SEM Assessment File 63M11-0015).

Geological Setting: Sparse outcrop in the vicinity of the showing was mapped as fine- to medium-grained hornblende-rich granulites and amphibolite (Johnston, 1984). Pyroclasts and amygdules are present and locally the sequence is garnetiferous. These mafic volcanics and volcaniclastics are considered to be a dismembered part of the Pine Lake Metavolcanics and contain minor amounts of chalcopyrite, pyrite and pyrrhotite, commonly as fracture coatings. The shear zone observed in the prospect pit is parallel, and probably related, to a major northeast-trending shear zone that passes through the middle of Pete Lake (Johnston, 1984).

Tabbernor Lake Area

Two showings have been discovered adjacent to the Tabbernor Fault in the vicinity of Tabbernor Lake. One showing is located at a small lake north of Tabbernor Lake and the other beside the long linear lake south of Tabbernor Lake.

Small Lake North of Tabbernor Lake

Location: On the south shore of the small lake north of Tabbernor Lake between two major splays of the Tabbernor Fault (UTM co-ordinates 606500 m E, 6172800 m N).

History and Development: The only work reported on this prospect was in 1968 by Tara Mining Limited, who completed two trenches and sampled the showing. The main showing is reported to be a 9 m wide gossan developed over pyrite bands that replace biotite-rich layers in gneisses. A trench along the lakeshore is reported to contain chalcopyrite and sphalerite stringers across a width of 3.5 m. Analyses of a 15 cm grab sample returned the following results: trace Au, 18.5 g/t (0.54 oz/ton) Ag, 2.44 percent Zn and 0.54 percent Cu (SEM Assessment File 63M11-0023).

Geological Setting: A brief examination during the summer of 1987 revealed that the host sequence is biotite-hornblende-quartzofeldspathic gneiss (7 to 10 percent total mafics), that is sheared and silicified in the vicinity of the showing.

Rus Claims/Wilbert Showing

Location: Approximately 1.5 km south of the southwest bay of Tabbernor Lake, 200 m west of the linear lake referred to informally by mining exploration personnel as 'Shear Lake' (Figure 11; UTM co-ordinates 608550 m E, 6172800 m N).

History and Development: In 1966, O. Hanson, W. Nemanyshen and W.J. Berezowsky undertook a potentiometer survey on CBS 786 which included the west side of Shear Lake. In the course of this work, a folded sulphide-bearing zone was discovered; subsequently in July of that year, Hanson drilled and blasted the showing. Three samples were submitted to Hudson Bay Mining and Smelting; the best assay obtained was 43.1 g/t (1.26 oz/ton) Au, 9.5 percent Cu and 19.9 g/t (0.58 oz/ton) Ag (SEM Assessment File 63M11-0024). The mineralized zone, which was again trenched in 1973 and 1974 by B.A. Kristian, was reported to be a 30 to 45 cm wide chalcopyrite vein with pyrite and sphalerite in a sheared and folded hornblende gneiss. Grab samples of the vein are reported to have high values of copper, gold and silver but actual assay results are not included in the assessment report (SEM Assessment File 63M11-0033). In 1975, Hudson Bay Exploration and Development Company, who held the claims under option from Hanson and Kristian, completed an HLEM survey. No significant anomalies were defined (SEM Assessment File 63M11-0032). The property was included in SMDC's 1980 prospecting permit MPP 1113 over which an airborne geophysical survey was completed (SEM Assessment File 63M11-0034). Subsequently in 1984, Claude Resources Inc. purchased the prospecting permit and geophysical database from SMDC and staked four claims (S-103192 to S-103195) to cover the showing. In 1985, Claude staked CBS 7590 within the permit area. Core Energy Corp. optioned CBS 7590 from Claude Resources, cut a semi-reconnaissance grid over part of the claim block and completed a magnetometer and VLF-EM survey in January 1986 (SEM Assessment File 63M11-0045). This work defined a magnetic low and an overlapping strong VLF-EM conductor that corresponded to the Tabbernor Fault. A second phase of exploration during May and June 1986, included geological mapping, lithogeochemical sampling and prospecting on the gridded area (SEM Assessment File 63M11-0046). Six one metre samples taken along the base of the cliff where the Wilbert Showing is exposed, ranged from 0.2 g/t (0.006 oz/ton) to 16.4 g/t (0.480 oz/ton) Au and averaged 2.4 g/t (0.071 oz/ton) Au. A suite of grab samples collected in the vicinity of the Wilbert Showing contained 44 to 2260 ppb Au. In March 1987, the Wilbert Showing was evaluated with three diamond drill holes that totaled 271.2 m in length (SEM Assessment File 63M11-0050). The mineralized sulphide zone exposed at the base of the Wilbert cliff face was not intersected in the drill holes and no significant assay results were obtained.

Geological Setting: The showing is hosted by a sequence of intermediate to felsic volcanic and volcaniclastic rocks of the Pine Lake Metavolcanics (Figure 11). It is located approximately 250 m west of the main trace of the north-south-trending Tabbernor Fault, on the west side of a north-northwest-trending splay of this fault. This fault splay, which forms one of several on the west side of the Tabbernor Fault, is defined by a prominent topographic lineament, as well as a VLF-EM conductor, and a linear magnetic low.

Cliffs to the west of the showing consist of andesite and hornblende porphyritic andesite containing several amygdaloidal horizons as well as quartz veinlets and abundant pods and clots of epidote. This sequence is deformed into a series of small scale folds that trend north and are characterized by variable plunges.

The Wilbert Showing is exposed along the base of a 4 to 5 m high northwest-trending cliff. The upper part of

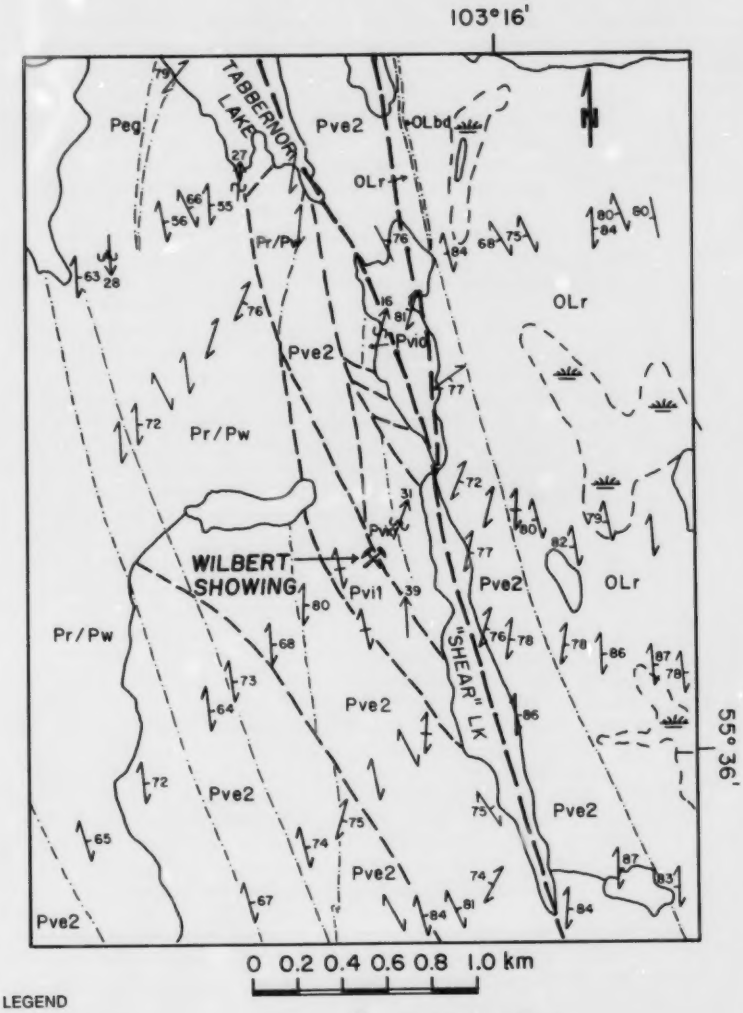


Figure 11 - Geological setting of the Wilbert Showing. Geology from Delaney (1987, 1990).

the cliff is a light-grey to tan, light-grey weathering, strongly foliated and folded, compositionally heterogeneous rock characterized by layers of various proportions of plagioclase, quartz and hornblende. Along the base of the cliff, the sequence is highly strained with an irregular, patchy rust-weathering sulphide horizon containing pyrite, malachite and chalcopyrite as well as minor chalcocite and bornite. Sulphides are localized in the noses of small-scale folds. Diamond drill holes failed to intersect the sulphide horizon either at depth (C 87-1) or to the northwest along strike (C 87-2). Diamond drilling revealed that the northwest-trending topographic lineament on the east side of the Wilbert Showing is underlain by hematized and epidotized breccia. This unit, and similar rocks along the Tabbernor Fault, is interpreted to be the product of late stage brittle deformation.

In addition to the analyses reported previously, three grab samples were collected from the Wilbert Showing by the author. Results are presented in Table 1.

Eisler Lake

DD

Location: In the west-trending, curvilinear shear zone marked by the valley at the northwest corner of Eisler Lake (Figures 12 and 13; UTM co-ordinates 599300 m E, 6164450 m N).

History and Development: The Eisler Lake area was included in an airborne magnetic and EM survey of the Reindeer River area, flown at a spacing of 200 m by Mansa Explorations in 1957 (SEM Assessment Files 63M11-0005 and -0006). SMDC included the area in an airborne EM and magnetic survey in 1980 (SEM Assessment File 63M11-0034). In 1985, Claude Resources Inc. undertook reconnaissance prospecting in an area encompassing the northern part of Eisler Lake (SEM Assessment File 63M11-0041). This work identified a new gold-copper showing 244 m west of the north end of Eisler Lake. Calpine Resources optioned CBS 7583 and CBS 7589, which cover the Eisler Lake area, from Claude Resources in 1986. Subsequent follow-up work in 1986, by J.A. Kelly for Cal-

Table 1a - Sixteen-element ICP-MS Assay Values for Selected Grab Samples from the Wilbert Showing. Au analysis is by Atomic Absorption. Analyses by Acme Laboratories, Vancouver.

Sample No. / Element		9022-1A	9022-1B	9022-1C
Sample Type		Grab sample pyritic horizon	Grab sample pyritic horizon	Grab sample pyritic horizon
Mo	(%)	0.002	0.002	0.001
Cu	(%)	1.13	1.04	1.17
Pb	(%)	0.02	0.02	0.02
Zn	(%)	0.04	0.04	0.04
Ni	(%)	0.01	0.01	0.01
Co	(%)	0.01	0.02	0.02
Mn	(%)	0.04	0.03	0.03
Fe	(%)	11.51	8.25	8.62
As	(%)	0.01	0.02	0.02
U	(%)	0.01	0.01	0.01
Th	(%)	0.01	0.01	0.01
Cb	(%)	0.01	0.01	0.01
Sb	(%)	0.01	0.01	0.01
Bi	(%)	0.01	0.01	0.01
Ag	(oz/t)	0.2	0.2	0.2
Au	(oz/t)	0.124	0.081	0.053

Table 1b - Geochemical Analyses for Grab Samples from the Wilbert Showing. Data for all elements was obtained by ICP analysis of a 0.500 gram sample digested in nitric aqua regia. For the elements shown in the table, this leach is considered partial for Mn, Fe, Sr, Ca, P, La, Cr, Mg, Ba, Ti, B and W and limited for Na, K and Al. Analyses by Acme Laboratories, Vancouver.

Sample No. / Element		9022-1A	9022-1B	9022-1C
Mo	(ppm)	5	3	1
Cu	(ppm)	11 818	10 714	12 294
Pb	(ppm)	2	2	2
Zn	(ppm)	68	46	81
Ag	(ppm)	3.7	2.8	2.7
Ni	(ppm)	30	32	20
Co	(ppm)	75	207	142
Mn	(ppm)	413	289	374
As	(ppm)	4	2	2
U	(ppm)	5	5	5
Th	(ppm)	1	1	1
Sr	(ppm)	8	6	6
Cd	(ppm)	1.8	1.5	1.2
Sb	(ppm)	7	5	6
Bi	(ppm)	3	4	2
V	(ppm)	76	65	83
La	(ppm)	3	2	2
Cr	(ppm)	28	20	27
Ba	(ppm)	36	36	46
B	(ppm)	2	2	2
W	(ppm)	1	1	1
Fe	(%)	10.82	7.9	8.43
Ca	(%)	0.19	0.16	0.19
P	(%)	0.052	0.044	0.06
Mg	(%)	1.46	1.08	1.5
Ti	(%)	0.2	0.16	0.19
Al	(%)	2.29	1.68	2.22
Na	(%)	0.05	0.05	0.06
K	(%)	0.9	0.73	0.98

pine Resources, identified mineralized quartz veins at a number of localities along the major east-trending shear zone at the northwest end of Eisler Lake (Figure 13; Budding and Kirkland, 1956). The mineralized part of the shear cuts metagabbro and is reported to have been traced over a strike length of 700 m (The Northern Miner, 1986a). Fifty two chip samples (from five trenches) included 14 samples with gold values in excess of 100 ppb and six samples with 1.1 to 7.9 g/t (0.032 to 0.23 oz/ton) Au (The Northern Miner 1986b, c). In January 1987, Calpine completed ground VLF-EM and magnetometer surveys over the north end of Eisler Lake including the shear zone (SEM Assessment File 63M11-0048). These surveys, and a subsequent duplicate one undertaken in late 1987, because of VLF-EM instrument malfunction, delineated a coincident strong EM conductor and magnetic low over the shear zone. Between March and May 1987, Calpine tested the shear zone with 20 drill holes (Figure 13; The Northern Miner, 1987b; SEM Assessment File 63M11-0051). Most cores contain shear zones with anomalous concentrations of gold over narrow intervals, but only two holes contain significant gold mineralization; DDH 87-6, 0.60 m of 5 g/t (0.146 oz/ton) Au; and DDH 87-15, 0.46 m of 10.5 g/t (0.308 oz/ton) Au. Anomalous gold is directly related to pyrite content. During the summer of 1988, Taiga Resources, on behalf of Calpine Resources, completed a program that included reconnaissance and detailed geological mapping and prospecting, soil and bulk till sampling on grids and stripping and sampling of gold showings (SEM Assessment File 63M11-0054). In 1990, American Ore Ltd. purchased a 15 percent interest in the property from Claude Resources and entered into an option agreement with Prime Resources (formed by a merger of Calpine and other companies in 1990) to earn an additional 49 percent. In 1991, Leeward Capital Corp. entered into an agreement to earn a 50 percent interest in American Ore's share of the property.

Geological Setting: Much of the north end of Eisler Lake is underlain by the basic to ultrabasic Eisler Lake Intrusive (Figures 12 and 13; Budding and Kirkland, 1956; Delaney, 1987). The intrusive, which tapers in width to the northwest, consists mostly of medium-grained mesocratic gabbro. An east-west elongated ultramafic phase of the intrusive underlies the north end of Eisler Lake. Minor phases in the gabbro are feldspar porphyry, diorite and granodiorite. Development of east-trending shear zones, such as the mineralized shear at Eisler Lake, was probably late in the tectonic evolution of the area.

Characteristics of Mineralization: The diamond drilling revealed that the shear zone in gabbro varies in width from 3.9 to 18.7 m, contains quartz veins of various thicknesses, as well as pyritized and locally calcareous intervals. This east-trending shear zone is similar to others close to the south margin of the Eyahpaise Pluton.

Georges–Uskik Lakes Area

Seven areas of gold mineralization have been identified in this region: Georges Lake, Wek, Kaz, Cam, Mac's,

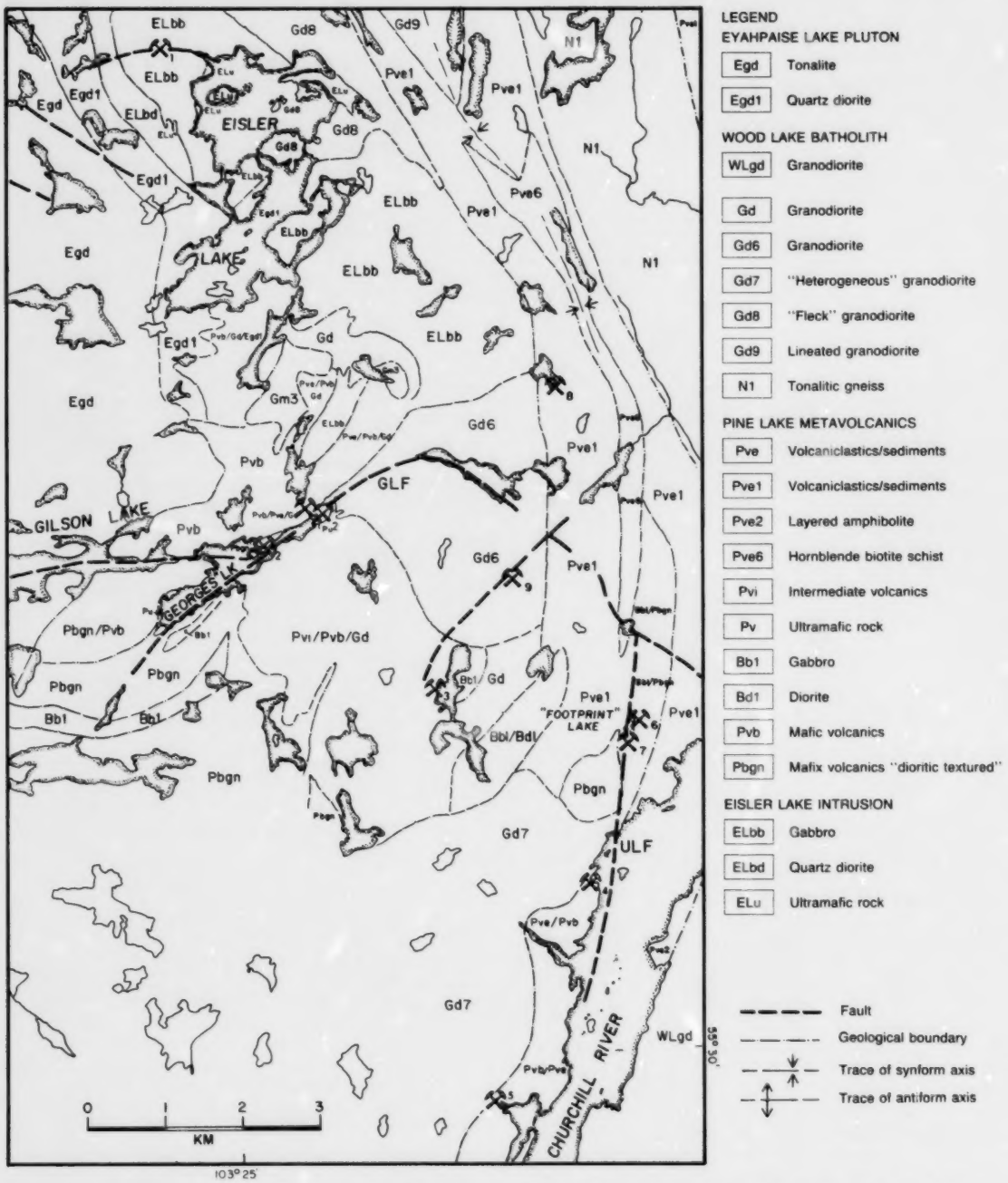
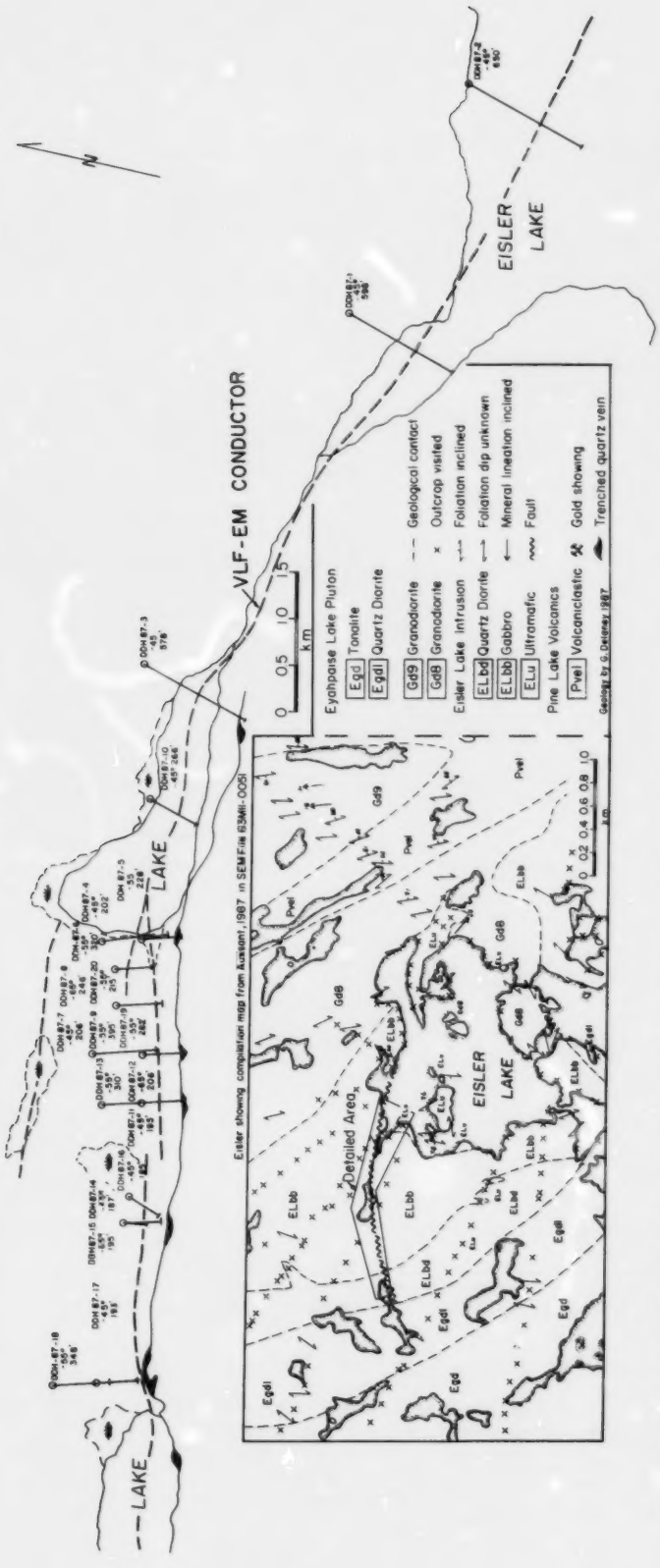


Figure 12 - Geological setting of gold showings in the area between Eisler Lake and the Churchill River. Geology after Delaney (1987). Names of showings or showing area, indicated by crossed hammers, are: 1=DD; 2=Georges Lake; 3=Kaz; 4=Wek; 5=Cam; 6=Footprint #1 and #2 Shears; 7=Footprint #3 Shear; 8=Mac's; and 9=BR-106. GLF=Georges Lake Fault; ULF=Uskik Lake Fault.

'Footprint Lake' and BR-106 (Figure 12). These include at least nine showings in the Georges Lake area and three at Footprint Lake. History and development, as well as the description of the geological setting of the showings, are combined for each area in the following section but characteristics of mineralization are described separately.

Georges Lake

Location: In 1990 there were nine stripped areas that contained variably mineralized quartz veins along the north and east sides of Georges Lake (No. 2 on Figure 12). These locations are shown on Figure 14 (UTM co-ordinates for these locations are: Camp Vein–



600230 m E, 6157950 m N; NR-50 Vein—600550 m E, 6158230 m N; Shoreline Vein—600220 m E, 6157880 m N; NR-4 Vein—600825 m E, 6158560 m N; NR-2 Vein—600850 m E, 6158500 m N; ER-5 Vein—601000 m E, 6158400 m N; VG Showing—601200 m E, 6158480 m N; Georges Lake Showing—601310 m E, 6158640 m N; and NR-62 Vein—601260 m E, 6158440 m N).

History and Development: The Georges Lake area was included in an airborne magnetic and EM survey of the Reindeer River area, flown at a spacing of 200 m by Mansa Explorations in 1957 (SEM Assessment Files 63M11-0005 and -0006). In 1968, Great Plains Oil and Gas Ltd. undertook geological mapping and prospecting of CBS 1300 that included the southwestern part of Georges Lake; at that time known as 'Jay Lake'. This work identified several small showings of chalcopyrite and one of molybdenite. Also a pyrite zone along the southwestern extension of the Georges Lake Fault was selected as a target for trenching (SEM Assessment File 63M11-0012). In 1986, Calpine Resources optioned CBS 7589 which encompasses the Georges Lake area, from Claude Resources. In early 1987, Calpine completed ground VLF-EM and magnetometer surveys over the prominent curvilinear topographic depression between the northeast end of Georges Lake and the next major lake to the northeast (SEM Assessment File 63M11-0048). Due to instrument malfunction, the VLF-EM part of this survey was subsequently repeated later in 1987. This survey defined a strong EM conductor which corresponds to the topographic depression and major northeast-trending curvilinear shear zone previously mapped by Budding and Kirkland (1956). Samples collected along the shear zone were reported to contain from 1.2 g/t (0.036 oz/ton) to 3.8 g/t (0.112 oz/ton) Au (The Northern Miner, 1986a). During the summer of 1988, Taiga Resources, on behalf of Calpine Resources, completed a program that included reconnaissance and detailed geological mapping and prospecting, soil and bulk till sampling on grids and stripping and sampling of quartz veins at four locations: Georges Lake Showing, VG Showing, Shoreline Vein and Camp Vein (Figure 14; SEM Assessment File 63M11-0054). One metre chip samples from a 4.5 m wide interval across the Georges Lake Showing contained up to 8760 ppb Au, whereas chip samples from the VG Showing returned several spectacular assay results including

Figure 13 - Trench plan, diamond drill hole locations and VLF-EM conductors, DD Showing, Eisler Lake. Inset shows the geological setting of the DD Showing.

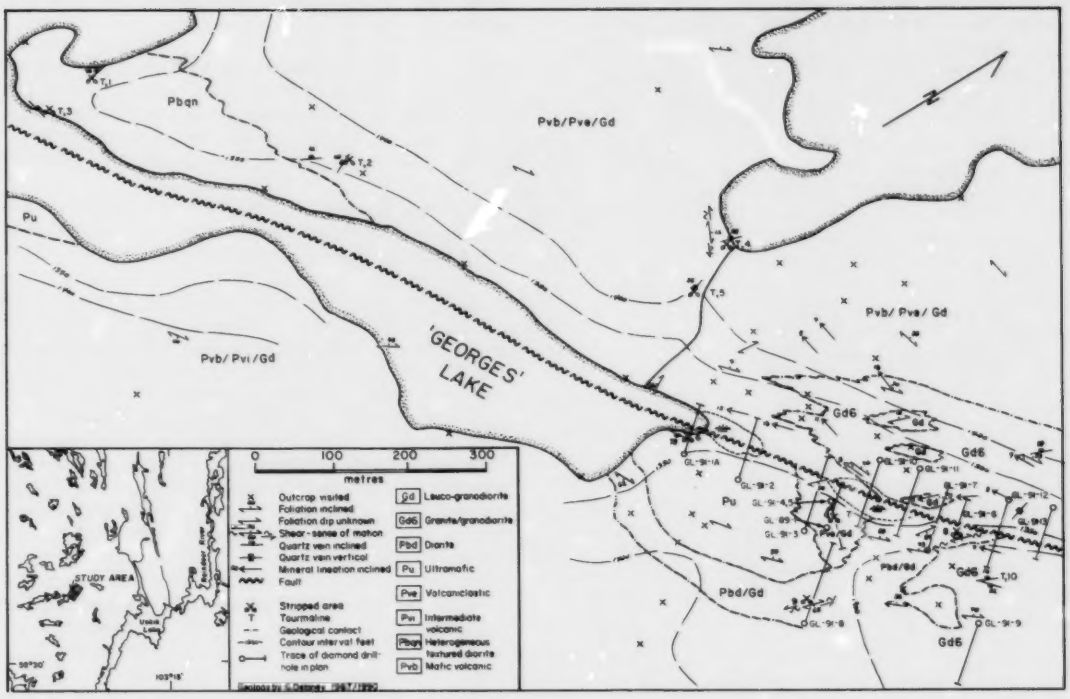


Figure 14 - Geological setting of gold showings in the Georges Lake area. Names of the showings, indicated by crossed shovels, are: 1=Camp Vein; 2=NR-50 Vein; 3=Shoreline Vein; 4=NR-4 Vein; 5=NR-2 Vein; 6=ER-5 Vein; 7=VG Showing; 8=Georges Lake Showing; 9=NR-62 Vein; and 10=unnamed narrow ferrigenous quartz veins.

96.2 g/t (2.81 oz/ton) Au over 0.4 m. The other two veins contained only anomalous concentrations of gold. These results prompted Calpine, in the fall of 1988, to commission Taiga to conduct a follow-up program that involved detailed geological mapping, prospecting, and magnetic, VLF-EM and soil geochemical surveys over an expanded grid system (SEM Assessment File 63M11-0056). Additional stripping, washing and channel sampling of both known and newly discovered vein systems was completed. This work, together with the earlier work in 1988, identified three sites of significant gold mineralization: VG Showing, Georges Lake Showing and NR-62 Vein as well as six other locations with anomalous gold in quartz veins (Figure 14). In 1990, American Ore Ltd. purchased a 15 percent interest in the property from Claude Resources and entered into an option agreement with Prime Resources (formed by a merger of Calpine and other companies in 1990) to earn an additional 49 percent. In 1991, Leeward Capital Corp. entered into an agreement to earn a 50 percent interest in American Ore's share of the property. As a part of this agreement, in the fall of 1991, Leeward drilled 13 holes totalling 1504 m (Figure 14) at the east end of Georges Lake (from October 30, 1991 press release, American Ore Ltd. and Leeward Capital Corp.). All holes are reported to have intersected zones from 0.5 to 18 m thick that contained quartz veining, sulphides and rare visible gold. Assay data, which have been made public, are presented in Table 2. Additional surface exploration completed during the drill program identified four new gold occurrences, two of which contained visible gold. As there is no additional information about these showings, they are not described in the following section.

The following account is based on information in the Saskatchewan Energy and Mines Mineral Assessment Files as well as mapping and sampling by the author during 1987 and 1990.

Geological Setting: The area is underlain by a variety of rock types, many of which host mineralized quartz veins (Figure 14). The main structural feature is the northeast-trending curvilinear Georges Lake Fault between Georges Lake and the unnamed seal-shaped lake approximately 2 km to the northeast. Near the center of Georges Lake, the fault bifurcates into west-southwest- and south-southwest-trending splays. The former can be traced through Gilson Lake for approximately 10 km to the west (Budding and Kirkland, 1956; Lewry, 1977); the latter for about 3 km southwest (Delaney, 1987).

Much of the area surrounding the northeast arm of Georges Lake is underlain by mixed mesocratic and melanocratic amphibolites (units Pvi and Pvb) and compositionally layered rocks that are either sediments or volcaniclastics (unit Pve). These are cut by lenses and irregular patchy areas of pinkish light-grey felsite to

Table 2 - Assay Results for Selected 1991 Diamond Drill Holes, Georges Lake Area (from October 30, 1991 press release, American Ore Ltd. and Leeward Capital Corp.).

Hole	Interval	Width	g/t Au
GL-6	36.50-37.15 m	0.65 m	22.11
			9.59 g/t Au over 1.65 m
	37.15-38.15 m	1.00 m	1.46
	89.30-90.40 m	1.10 m	7.80
GL-7	26.80-27.55 m	0.75 m	7.60
			4.60 g/t Au over 1.80 m
	27.55-28.60 m	1.05 m	2.46
GL-10	36.57-37.27 m	0.70 m	9.00
	44.76-45.20 m	0.46 m	3.00

leucocratic granodiorite (unit Gd). The peninsula on the northwest side of the arm of Georges Lake is underlain by heterogeneously textured diorite to tonalite (unit Pbqn). At the northeast end of Georges Lake, on the southeast side of the fault, there is a body of drab green medium- to coarse-grained, foliated to massive, uralitized ultramafic rock (unit Pu). Other small bodies of this ultramafic occur on the southeast side of Georges Lake (Budding and Kirkland, 1956; Delaney, 1987). The ultramafic unit is adjacent to an irregular-shaped body of fine- to medium-grained, dark green diorite (unit Pbd) that is also locally cut by patchy bodies of felsite to granodiorite (unit Gd). The southeast corner of the map area (shown in Figure 14) is underlain by salmon buff granodiorite to granite (unit Gd6) that typically contains 10 to 12 percent biotite and hornblende as well as a few percent of magnetite. This is the southeast portion of a much more extensive granitic body (Delaney, 1987).

Most of the rocks underlying this area have been subjected to several phases of deformation and metamorphism.

There are subsidiary faults and several small scale shear zones in rocks flanking the main Georges Lake Fault. Quartz veins are associated with many of these structures which are commonly developed in zones of lithologic heterogeneity (Figures 15 and 16).

Characteristics of Mineralization: Along the north and east sides of Georges Lake (Figure 14), nine stripped areas have exposed variably mineralized quartz veins.

Camp Vein - Approximately 75 m north of the Shoreline Vein, a gossan zone is developed over a series of 0.03 to 1.5 m thick, north-trending, quartz-tourmaline veins that dip steeply to the west. Tourmaline, which occurs both in irregular fractured blobs and wispy clots, locally composes up to 80 percent of the vein. The veins are hosted in a greenish-grey, medium-grained, mesocratic hornblende-plagioclase rock. A chip sample collected across the thickest vein contained 119 ppb Au (Table 3); the best result reported during evaluation by Calpine Resources was 164 ppb Au over 1 m (SEM Assessment File 63M11-0054).

NR-50 Vein - An approximately 12 m square area has been stripped revealing a series of quartz-tourmaline-pyrite veins which trend 157° and dip 43° to the west. The quartz veins, which pinch and swell abruptly to a maximum of 1.5 m thick, are hosted in a sequence of feldspathized hornblende tuffs intruded by felsite veins. Two chip samples collected across the vein contained 5 and 12 ppb Au (Table 3).

Figure 15 - Detailed map of a portion of the stripped areas exposed at the NR-4 Vein (location 4 on Figure 14). Solid lines terminated with tick marks show the location of chip samples (Table 3). Distance between the two stripped areas is drawn to scale.

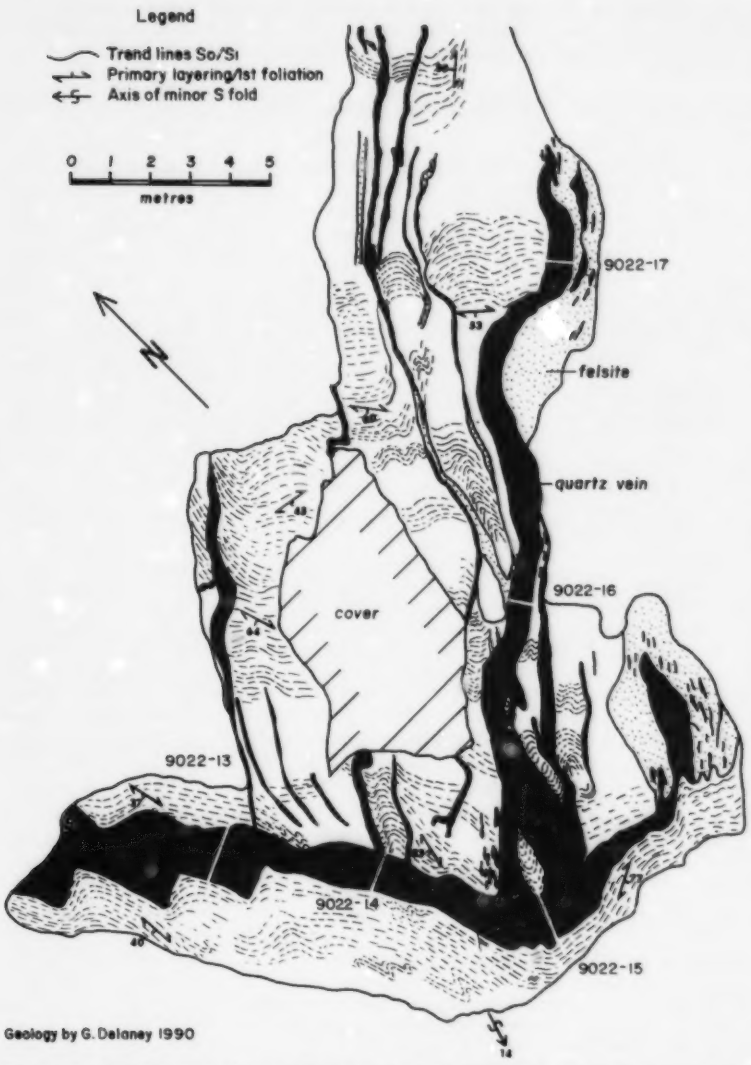


Figure 16 - Detailed map of the auriferous quartz vein exposed in the main stripped area of the VG Showing (location 7 on Figure 14). Solid white lines show the location of chip samples (Tables 4a and 4b).

Shoreline Vein - A northeast-trending milky quartz-tourmaline vein that dips moderately to the northwest is exposed on the northwest side of the entrance to the narrows of the arm at the east end of the lake (Delaney, 1987). This vein, which is reported to be at least 2.75 m thick, contains minor pyrite as fracture filings and pods; a chip sample collected over a width of 1 m contained 214 ppb Au (SEM Assessment File 63M11-0054).

NR-4 Vein - This showing is characterized by a series of irregular, wispily-terminated quartz-tourmaline veins in a sequence of compositionally layered biotite and biotite-hornblende schists cut by felsite veins (Figure 15). Three chip samples collected by the author contained between 11 and 610 ppb Au (Table 3).

NR-2 Vein - The showing is characterized by a series of tourmaline-bearing quartz veins that strike at 158° and dip 25° southwest. Quartz veins pinch and swell in thickness to a maximum of 30 cm. The veins are contained in a mottled light grey to pink weathering, strongly feldspathized sequence that also contains quartz veins containing hornblende and microcline. A chip sample across a 30 cm wide quartz-tourmaline vein contained 370 ppb Au (Table 3); another chip sample collected across 90 cm contained 526 ppb (SEM Assessment File 63M11-0056).

ER-5 Vein - This showing, at the end of the northeastern arm of Georges Lake, consists of a northeast-trending milky quartz vein that dips moderately to the southeast. Rare pyrite, pyrrhotite and chalcopyrite are present in the vein which has a minimum thickness of 85 cm and is exposed intermittently over 17 m (SEM Assessment File 63M11-0056). True thickness could not be determined as it is covered by mud on the northwest side. The hanging wall to the vein is a massive, dark green, medium-grained, uralitized ultramafic rock with rust coatings on fracture surfaces. A channel sample collected across the vein contained 230 ppb Au.

VG Showing - This showing, which is not only the most spectacular, but also the most economically significant of the gold showings in the Georges Lake area, is located a few tens of metres south of the trace of the Georges Lake Fault. Mineralization is exposed in a 17 by 27 m area and an adjacent 8 by 10 m stripped and sluiced area (Figure 16) as well as a few smaller outcrops that have been cleaned off. In the large stripped outcrop, a sequence of compositionally layered volcaniclastics intruded by felsite is cut by a thick quartz vein folded into an antiform plunging shallowly to the south-southwest. Locally the vein bifurcates. There are also several narrow subparallel quartz veins within the narrow south-southwest-trending, mostly sinistral shear zones, that dissect the outcrop. The northwest limb of the folded quartz vein can be traced for 15 m before it passes beneath a 6 m interval of overburden, then reappears in the 8 by 10 m stripped area. There the main quartz vein appears to bifurcate into a 3 m thick vein that trends west (SEM Assessment Files 63M11-0054 and -0056). Brittle-ductile deformation of the felsite appears to have controlled distribution of the

Table 3 - Geochemical Analyses for Sample Suite from the Georges Lake Area. Data for all elements except gold was obtained by ICP analyses of a 0.500 gram sample digested in nitric aqua regia. For the elements shown in the table, this leach is considered partial for Mn, Fe, Sr, Ca, P, La, Cr, Mg, Ba, Ti, B and W and limited for Na, K and Al. Au analysis is by Atomic Absorption. Analyses by Acme Laboratories, Vancouver.

Sample No. / Element	8722-99	9022-7	9022-9	9022-10	9022-19	9022-22	9022-23	9022-24	9022-26	9022-29	9022-30	9022-31	9022-33
Mo (ppm)	5	4	4	2	6	4	6	3	8	4	6	4	6
Cu (ppm)	25	49	404	213	35	80	11	69	32	8	40	32	104
Pb (ppm)	25	8	4	10	3	2	2	2	2	2	2	2	3
Zn (ppm)	28	9	56	42	1	1	9	1	1	5	5	1	2
Ag (ppm)	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Ni (ppm)	16	1	2	7	10	39	8	12	10	12	10	11	8
Co (ppm)	2	1	5	10	1	5	1	2	1	1	2	2	1
Mn (ppm)	69	140	245	255	34	66	70	76	36	152	58	38	32
As (ppm)	2	2	2	3	2	2	2	2	2	5	2	2	2
U (ppm)	5	5	5	5	5	5	5	5	5	5	5	5	5
Th (ppm)	1	1	3	4	1	1	1	1	1	1	1	1	1
Sr (ppm)	2	9	10	8	1	1	1	1	1	1	1	1	2
Cd (ppm)	1	0.4	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Sb (ppm)	2	2	2	2	2	2	2	2	2	2	2	2	2
Bi (ppm)	2	3	2	5	65	3	2	4	27	2	3	5	2
V (ppm)	6	8	3	10	1	1	1	3	1	3	2	1	1
La (ppm)	2	4	14	14	2	2	2	2	2	2	2	2	2
Cr (ppm)	29	3	13	8	49	20	48	11	57	15	53	12	43
Ba (ppm)	10	66	61	80	3	1	2	4	5	2	7	1	9
B (ppm)	2	2	3	7	2	2	16	17	17	11	6	7	34
W (ppm)	1	1	1	1	1	1	1	2	1	1	1	1	1
Au (ppb)	1	440	169	5120	1630	230	11	79	610	370	5	12	119
Fe (%)	0.85	2.28	2.22	2.15	0.64	0.56	0.43	0.97	0.73	0.37	0.56	0.51	1.36
Ca (%)	0.07	0.06	0.32	0.26	0.01	0.07	0.16	0.03	0.01	0.08	0.05	0.01	0.01
P (%)	0.005	0.022	0.018	0.018	0.002	0.001	0.004	0.002	0.005	0.005	0.005	0.001	0.007
Mg (%)	0.19	0.09	0.12	0.37	0.01	0.06	0.04	0.07	0.02	0.15	0.05	0.01	0.01
Ti (%)	0.01	0.05	0.04	0.09	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01
Al (%)	0.15	0.47	0.49	0.82	0.01	0.03	0.06	0.13	0.05	0.09	0.02	0.01	0.03
Na (%)	0.02	0.07	0.06	0.07	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
K (%)	0.04	0.19	0.18	0.42	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.03

Sample descriptions and locations:

8722-99 Grab sample from quartz-tourmaline vein at the NR-50 Vein (location 2, Figure 14).
9022-7 Chips across quartz vein system at location 10, Figure 14.
9022-9 Rusty weathering zone in altered pyritic granodiorite at the Georges Lake Showing (location 8, Figure 14).
9022-10 Quartz vein in altered granodiorite at the Georges Lake Showing (location 8, Figure 14).
9022-19 Ferrigenous quartz vein - 16 cm wide at the NR-62 Vein (location 9, Figure 14).
9022-22 Chip sample across 50 cm thick milky quartz vein at the ER-5 Vein (location 6, Figure 14).
9022-23 Chip sample across quartz-tourmaline vein at the NR-4 Vein; location shown on Figure 15).
9022-24 Chip sample across quartz-tourmaline vein at the NR-4 Vein; location shown on Figure 15).
9022-26 Chip sample across quartz-tourmaline vein at the NR-4 Vein; location shown on Figure 15).
9022-29 Chip sample across 30 cm wide quartz vein at the NR-2 Vein (location 5, Figure 14).
9022-30 Chip sample across quartz vein system, south side of outcrop at the NR-50 Vein (location 2, Figure 14).
9022-31 Chip sample across quartz vein system, center of the stripped area, NR-50 Vein (location 2, Figure 14).
9022-33 Chip samples across quartz-tourmaline veins at the Camp Vein (location 1, Figure 14).

quartz vein system along the east limb of the antiform and to the west in the vicinity of the smaller of the two large stripped areas.

Visible gold was observed at four places in the main vein as well as at one spot in one of the narrow minor quartz veins along the southwest-trending narrow shear zones. Native gold occurs in vuggy limonitic cavities, in rusty fractures and as tiny grains in the quartz (SEM Assessment File 63M11-0056). Distribution of gold is erratic; the highest assay values are from samples collected at or near fold closures. For example on the east side of the nose of the main fold, a 65 cm wide chip sample of the quartz vein containing visible gold assayed 254,000 ppb (7.41 oz/ton) Au; a 1 m wide chip sample of the same vein, collected 3 m along the east limb from the high grade sample, contained 44 ppb Au (SEM Assessment File 63M11-0056). Assay results for a series of chip samples collected by the author are presented in Tables 4a and 4b. Although this showing was tested by five diamond drill holes (Figure 14), the only assay results reported (Table 2) are for hole GL-91-

10, which tested an area 25 m northeast of the stripped area.

Georges Lake Showing - This showing, exposed on a west-facing scarp face, southeast of the trace of the Georges Lake Fault, is the first discovery site of mineralization in the Georges Lake area. During 1988, the scarp face was stripped and washed at three locations along a distance of 20 m (SEM Assessment File 63M11-0054). These trenches reveal that the mineralization is at the contact between a heterogeneously sheared, mottled, 'bleached-looking' leucocratic granodiorite on the east or upper part of the scarp and a mesocratic diorite to the west. The granodiorite is dissected by several discrete fracture sets and contains blotchy irregular ferruginous weathering patches, as well as an irregular network of grey quartz veins which pinch and swell in thickness from 1 to 40 cm. Chip samples collected from the three trenches contained from 150 to 8760 ppb Au (SEM Assessment File 63M11-0054); two grab samples collected by the author contained 169 and 5120 ppb Au (Table 3). Diamond drill hole GL-91-6, which passed under the stripped area, and diamond drill hole GL-91-7, 25 m to the southwest (Figure 14), both intersected gold mineralization (Table 2).

NR-62 Vein - At this showing a rust-weathering, contorted quartz vein with a maximum thickness of 16 cm occurs in a southeast-trending shear zone in a dark green, hornblende porphyroblastic diorite. Near the southern limit of the stripped area, the quartz vein crosscuts a light grey felsite dyke containing cherty patches. A sinistral shear zone that trends 015° and dips 65° east is present along the eastern contact of the felsite. The quartz vein, which is reported to contain pods of pyrite, chalcopyrite and galena, returned gold values of 3280, 2160 and 1440 ppb Au for chip samples of widths of 35, 42 and 45 cm respectively (SEM Assessment File 63M11-0056); a grab sample collected by the author contained 1630 ppb Au (Table 3).

There appears to be two distinct types of quartz veins related to the Georges Lake Fault. Major quartz vein systems on the northwest side of the fault contain abundant tourmaline and minor pyrite as accessory minerals. Although these veins contain anomalous concentrations of gold (see Table 3), no economically significant enrichments have been discovered. Figure 15 illustrates the wispily-terminated, lenticular morphology of the quartz tourmaline veins at the NR-4 Showing, one of the quartz-tourmaline vein systems. This morphology is typical for these veins which at some places are as much as 1.6 m thick.

Table 4a - Geochemical Analyses of Samples from Quartz Vein at VG Showing 7, Georges Lake Area. Locations of samples are shown on Figure 16. Data for all elements was obtained by ICP analysis of a 0.500 gram sample digested in nitric aqua regia. For the elements shown in the table, this leach is considered partial for Mn, Fe, Sr, Ca, P, La, Cr, Mg, Ba, Ti, B and W and limited for Na, K and Al. Au analysis is by Atomic Absorption. Analyses by Acme Laboratories, Vancouver.

Sample No. / Element	9022-13	9022-14	9022-15	9022-16	9022-17	9022-18
Mo (ppm)	5	13	4	6	5	11
Cu (ppm)	1018	486	334	40	60	431
Pb (ppm)	2	2	2	2	2	3
Zn (ppm)	36	26	1	10	3	14
Ag (ppm)	1.2	0.8	10.5	0.1	0.2	0.4
Ni (ppm)	24	26	15	10	13	51
Co (ppm)	11	14	2	1	2	28
Mn (ppm)	194	87	27	31	74	46
As (ppm)	2	2	2	2	2	3
U (ppm)	5	5	5	5	5	5
Th (ppm)	1	1	1	1	1	1
Sr (ppm)	4	6	1	2	3	1
Cd (ppm)	0.8	0.3	0.2	0.2	0.2	0.2
Sb (ppm)	2	2	2	2	2	2
Bi (ppm)	6	4	2	2	2	5
V (ppm)	60	20	1	3	12	3
La (ppm)	2	2	2	2	2	2
Cr (ppm)	15	47	8	45	10	44
Ba (ppm)	46	21	1	7	24	3
B (ppm)	2	2	2	2	2	2
W (ppm)	1	1	1	1	1	1
Au (ppb)	3	3	482	2	2	2
Fe (%)	2.23	2.17	0.49	0.52	0.59	1.63
Ca (%)	0.12	0.09	0.01	0.02	0.04	0.04
P (%)	0.014	0.004	0.001	0.005	0.002	0.001
Mg (%)	0.4	0.15	0.01	0.04	0.05	0.01
Ti (%)	0.09	0.01	0.01	0.01	0.01	0.01
Al (%)	0.63	0.29	0.01	0.07	0.14	0.03
Na (%)	0.02	0.02	0.01	0.01	0.01	0.01
K (%)	0.08	0.06	0.01	0.01	0.04	0.01

Table 4b - Sixteen-element ICP-MS Assay Values for Samples from Quartz Vein at VG Showing 7, Georges Lake Area. Locations of samples are shown on Figure 16. Au analysis is by Atomic Absorption. Analyses by Acme Laboratories, Vancouver.

Sample No.	9022-13	9022-14	9022-15	9022-16	9022-17	9022-18
Mo (%)	0.002	0.002	0.001	0.001	0.001	0.002
Cu (%)	0.1	0.06	0.04	0.01	0.01	0.05
Pb (%)	0.02	0.02	0.02	0.02	0.02	0.02
Zn (%)	0.04	0.03	0.03	0.03	0.03	0.03
Ni (%)	0.01	0.01	0.01	0.01	0.01	0.01
Co (%)	0.01	0.01	0.01	0.01	0.01	0.01
Mn (%)	0.01	0.01	0.01	0.01	0.01	0.01
Fe (%)	2.36	2.33	0.53	0.49	0.57	1.88
As (%)	0.02	0.01	0.01	0.01	0.01	0.01
U (%)	0.01	0.01	0.01	0.01	0.01	0.01
Th (%)	0.01	0.01	0.01	0.01	0.01	0.01
Cd (%)	0.01	0.01	0.01	0.01	0.01	0.01
Sb (%)	0.01	0.01	0.01	0.01	0.01	0.01
Bi (%)	0.01	0.01	0.01	0.01	0.01	0.01
Ag (oz/t)	0.2	0.2	0.2	0.2	0.2	0.2
Au (oz/t)	0.085	0.159	0.247	0.001	0.052	0.23

Sample description:

9022-13	Chip sample of quartz vein
9022-14	Chip sample of quartz vein
9022-15	Chip sample of quartz vein
9022-16	Chip sample of quartz vein
9022-17	Chip sample of quartz vein
9022-18	Grab sample of quartz vein

In contrast, most quartz veins on the southeast side of the Georges Lake Fault are characterized by vuggy calcite-rich patches and in some instances contain more iron sulphides than the veins on the northwest side of the fault. Visible gold has been observed, although distribution is erratic, and at least locally appears controlled by fold closures. Tourmaline is absent in most veins, although at one locality narrow quartz-tourmaline veins cut the quartz-calcite-pyrite veins. The stripped area at the VG Showing is the best exposure of the non-tourmaline-bearing type of mineralized quartz vein system; however, mineralized quartz veins have been discovered elsewhere along the south side of the Georges Lake Fault and were encountered in 13 diamond drill holes which tested 480 m of strike length of the fault at the northeast end of Georges Lake. Further evaluation of this structure and related subsidiary structures is required to fully assess its potential.

Wek/Main/Church

Location: On the west shore of the Churchill River approximately 1 km southwest of Uskik Lake (No. 4 on Figure 12; UTM co-ordinates 604500 m E, 6153750 m N).

History and Development: In 1955, K. Wierzycki staked three groups of claims that included this showing (Beck, 1959). In 1956, Wierzycki completed trenching and 4 diamond drill holes (368 m) to test the prospect. Significant intersections include 0.8 m in hole 2 that assayed 0.24 percent Cu and 1 g/t (0.03 oz/ton) Au; and 0.5 m in hole 3 that contained 0.08 percent Cu and 11.6 g/t (0.34 oz/ton) Au (SEM Assessment Files 63M11-0002 and -0003). Hudson Bay Mining and Smelting Company optioned the claims and completed an EM survey over the area of the showing in 1958 (SEM Assessment File 63M11-0004). No conductors were located and no further work was carried out. In 1969, Oro Mines optioned the showing from V. Studer. The company sampled the trenched areas, undertook a new EM and magnetic study on the property and completed four diamond drill holes for a total of 91 m. Several intervals in the holes have anomalous concentrations of gold, silver and copper. The best intersection is in hole 2 where a 0.9 m interval assayed 42.5 g/t (1.26 oz/ton) Au, 59 g/t (1.70 oz/ton) Ag and 2.44 percent Cu. This mineralization is hosted in "a dioritic textured quartz-hornblende-biotite schist with both disseminations and blebs of chalcopyrite" according to drill logs in SEM Assessment File 63M11-0020 (Figures 17 and 18).

In 1985, Claude Resources staked CBS 7591 which includes the Wek Showing. Subsequently, Glitter Gold Mines Ltd. optioned CBS 7591 from Claude Resources, and in March of 1986 completed magnetometer, VLF-EM surveys and prospecting over an area which included the showing. Six grab samples collected during the course of this work contained 10 to 2450 ppb Au, 1.2 to 8.3 ppm Ag and 153 to 6371 ppm Cu. Although there was no geophysical expression of the showing, several moderate to strong north-south- and northeast-southwest-striking conductors were defined on adjacent ground (SEM Assessment File 63M11-0038). During the summer of 1986, Mascot Gold Mines, on behalf of Glitter Gold Mines, completed a second phase of exploration that included regional prospecting over all of CBS 7591 and diamond drilling and soil geochemistry on the grid which encompasses the showing (SEM Assessment File 63M11-0049). The soil survey identified some short, weakly anomalous, east-trending zones. Ten diamond drill holes (for a total of 759.3 m) tested the showing (Figure 19) and defined a near vertical main shear zone for a strike length of over 200 m as well as a number of subsidiary shears trending between 032° and 050°. Most shearing is developed in fine-grained, dark grey to dark greenish-grey greywacke unit with compositional banding. Other rock types present include plagioclase-hornblende porphyry, very fine-grained, magnetite-bearing siliceous rock that was called 'quartzite' in the drill logs and fine- to medium-grained diorite. Narrow quartz veins with pyrite and chalcopyrite in the shear zones returned the best gold values; only two short samples of drill core returned values in excess of 0.10 oz/ton Au. In early 1987, Glitter Gold Mines terminated its agreement with Claude Resources and ownership of the property reverted back to the latter. CBS 7591 lapsed in August 1989.

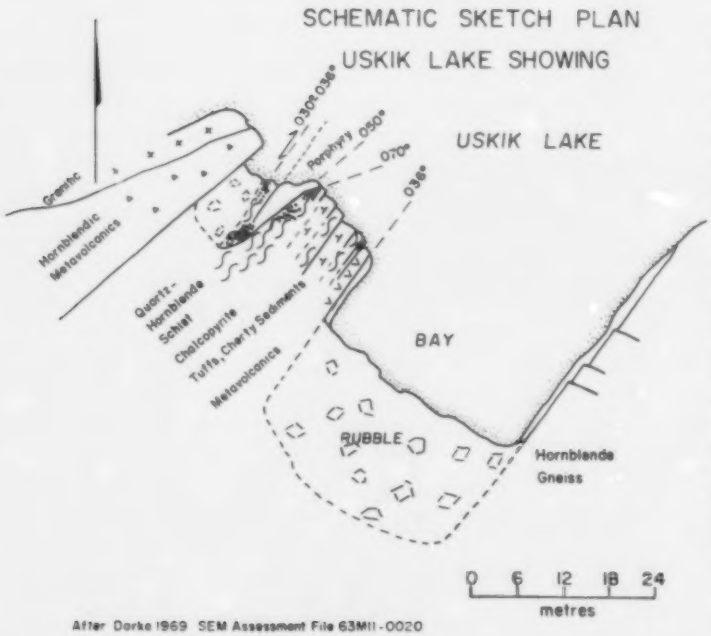


Figure 17 - Sketch map of the area around the Wek Showing at Uskik Lake.

Subsequently, in 1990, joint venture partners Starrex Mining Corp. Ltd. and

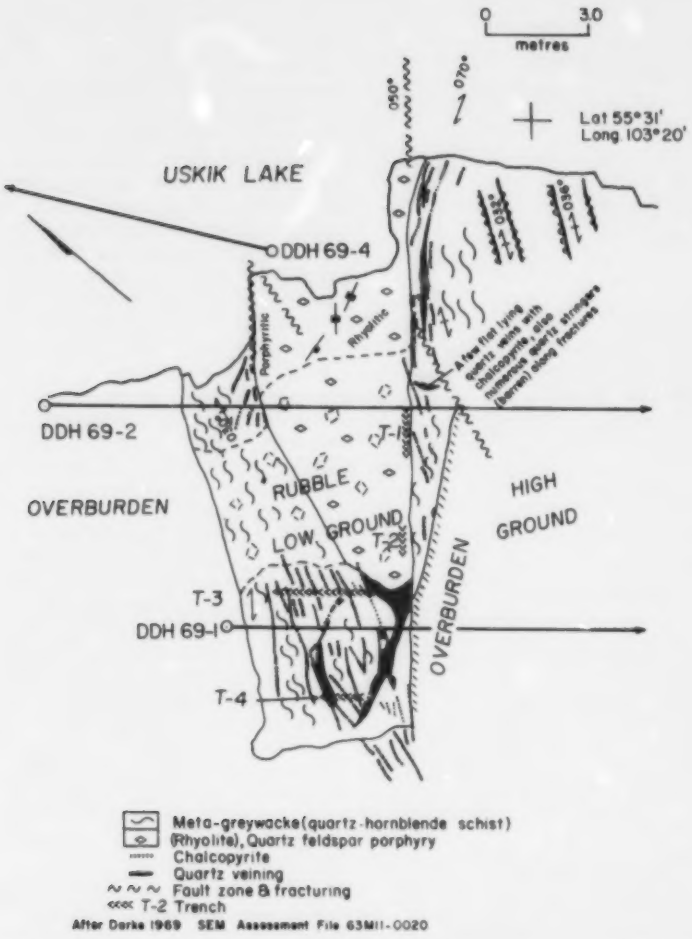


Figure 18 - Geological sketch map showing the distribution of quartz veins, chalcopyrite, high-strain zones and 1969 diamond drill holes, Wek Showing.

American Ore Ltd. staked the Whitford Bay Property (S-99347) which included the Wek Showing. Work during the summer of 1990 included a photogeological lineament study of S-99347 and selective geological mapping and prospecting including some work in the vicinity of the Wek (SEM Assessment File 63M11-0057). In the fall of 1990, Taiga Consultants, on behalf of the joint venture partners, completed a follow-up program that included a more detailed photogeological study demonstrating the apparent relationship between certain lineaments and gold mineralization. During this work, Taiga stripped and washed the showing and then completed detailed geological mapping and channel sampling. Gold contents of up to 36,200 ppb (1.056 oz/ton) Au were obtained from a 1 m wide channel sample collected near the main quartz vein (R. Chisholm, pers. comm., 1991).

Geological Setting: Exposure on the property is poor. The geological setting of the showings is provided by Figures 17 and 18 and is included in the preceding discussion of history and development.

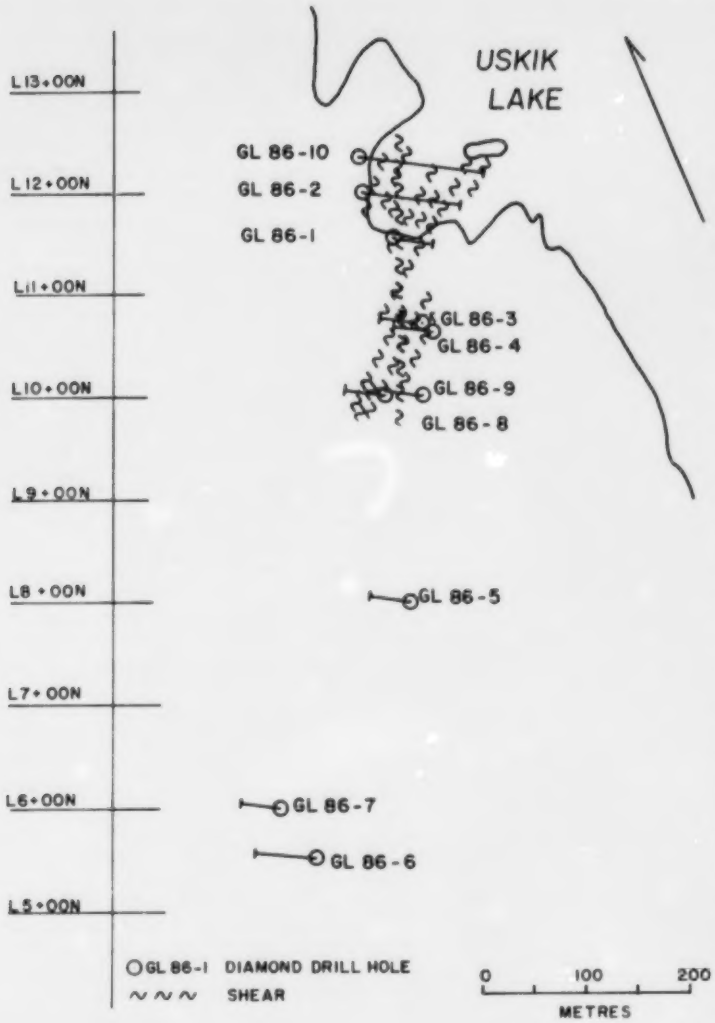
Characteristics of Mineralization: K.H. Darke, who undertook a property evaluation for Oro Mines, noted that sulphide mineralization, predominantly chalcopyrite, occurs in four settings: "1) narrow seams along fractures and shear planes within a quartz-hornblende schist (meta-greywacke); 2) as irregular blebs and masses within quartz veins and stringers; 3) as a few isolated blebs and minor fracture fillings with a quartz-feldspar porphyry and rhyolite; and 4) a few concentrations of chalcopyrite also occur in flat-lying, quartz vein-filled fractures" (Darke, 1969, p2-3 in SEM Assessment File 63M11-0020). He also noted that mineralization appears to be controlled by a main shearing direction that trends 030° to 036° as well as two sets of minor fractures that trend 050° and 070° to 075° (Figures 17 and 18).

Recently, the showing was stripped and washed, exposing mafic tuffs and felsite containing a northeast-striking, vertically-dipping quartz vein with clots of chalcopyrite and pyrite. This vein, which has been traced for 22 m southeast from the shore of Uskik Lake, averages 35 cm in width. To the northwest of the vein is a zone up to 4 m wide that contains narrow quartz veins and lenses of massive pyrite and chalcopyrite. A 2.35 m wide channel sample of this zone contained 13.8 g/t (0.404 oz/ton) Au including a 1 m interval that assayed 25.6 g/t (0.747 oz/ton) Au. Shears and fractures which host the mineralization are postulated to be splay faults or tension gashes related to the north-south-trending Uskik Lake Fault, the trace of which is projected to lie about 100 m offshore in Uskik Lake (R. Chisholm, pers. comm., 1991).

Copper King/Cam Group

Location: On the south side of the small creek that flows into a bay on the northwest side of the Churchill River approximately 5 km up-river from Uskik Lake (Location 5 of Figure 12; UTM co-ordinates 603350 m E, 6150710 m N).

History and Development: In reconnaissance investigations in 1929 or 1930, Satterly (1932) noted that the showing was exposed in two trenches. Other than this observation, there is no further record of the early history of the property. The showing was contained within the Copper King claims staked by Laurine in July 1948; in 1950, the Jug claims were staked over the Copper King claims. The only documented work during this period was a property inspection by M.F. Norris in 1950



After Mascot Gold Mines Figure 5 SEM Assessment File 63M11-0049

Figure 19 - Map of the distribution of 1986 diamond drill holes and high-strain zones distinguished during that work, Wek Showing.

(SEM Assessment File 63M6-0009). In 1952, C.J. Cameron staked the Cam group of 13 claims that included the showing. Subsequently, in 1956, ownership of these claims was transferred to Quintnor Mining Partnership (Beck, 1959). Trenching by this company exposed chalcopyrite mineralization over a northeast-trending zone 122 m long (Figure 20; SEM Assessment File 63M6-0004). A three foot interval sampled in Trench 17 contained 4.2 percent Cu and 10 g/t (0.29 oz/ton) Au; a grab sample collected about 24 m northwest of Trench 1 contained 9.4 percent Cu, 5.1 g/t (0.15 oz/ton) Ag and 1.4 g/t (0.04 oz/ton) Au; high copper values and elevated gold concentrations were also noted in other samples from the trenches. The main trenched area was tested with a 9.75 m diamond drill hole in September 1955. In 1957, Nova Uranium Mines Ltd. optioned the property, completed an electromagnetic (Doolimiter) survey and drilled nine holes that totalled 269 m in length. Holes C-1 and C-3 intersected narrow widths of chalcopyrite mineralization beneath the vicinity of the main showing but the other holes did not reveal significant mineralization. Descriptions of the showing are presented in Kirkland (1957), who noted that Satterly had misidentified the location in his earlier report, and Beck (1959).

In 1969, the showing and immediate area, which at that time was covered by ML 5015, was tested with seven short diamond drill holes, totalling 44.8 m, by Norsak Mines under a partnership agreement with Quintnor Mining Partnership (SEM Assessment File 63M06-0011). One assay result from an undisclosed interval in hole 2 is reported as 12.15 percent Cu, 9.6 g/t (0.28 oz/ton) Ag and nil Au. In 1984, D. Partridge, on behalf of Vista International Petroleums Ltd., re-evaluated the property with a program that included a VLF-EM-16 survey, prospecting, geological mapping and biogeochemical sampling (SEM Assessment File 63M6-0030). A 48 cm channel sample across the shear zone hosting the main showing assayed 2.5 g/t (0.074 oz/ton) Au, 167 g/t (4.8 oz/ton) Ag and 54,000 ppm Cu.

Geological Setting: The showing is in a narrow curvilinear belt of mafic metavolcanics along the Churchill River between the west side of Uskik Lake and Trade Lake (Budding and Kirkland, 1956; Kirkland, 1957; Chakrabarti, 1969; Delaney, 1987). The volcanic belt is flanked by large areas of granitoid rocks. Kirkland (1957) reported that the area near the main "Creek Showing" is underlain by a sequence of fine-grained, black, hornblende-rich metavolcanics and that pillow structures are present nearby. The sequence is cut by a 1.5 m wide, northeast-trending shear zone in hornblende-biotite schist that dips 70° northwest. The hanging wall of the shear zone is chloritized for a width of 0.6 m. Direction of movement cannot be ascertained as kinematic indicators are contradictory. Blebs and stringers of chalcopyrite and pyrrhotite occur throughout the shear zone with the greatest concentration in the hanging wall where sulphides compose as much as 25 percent of the rock; chalcopyrite forms up to 75 percent of these sulphides. Adjacent wall rocks do not appear to

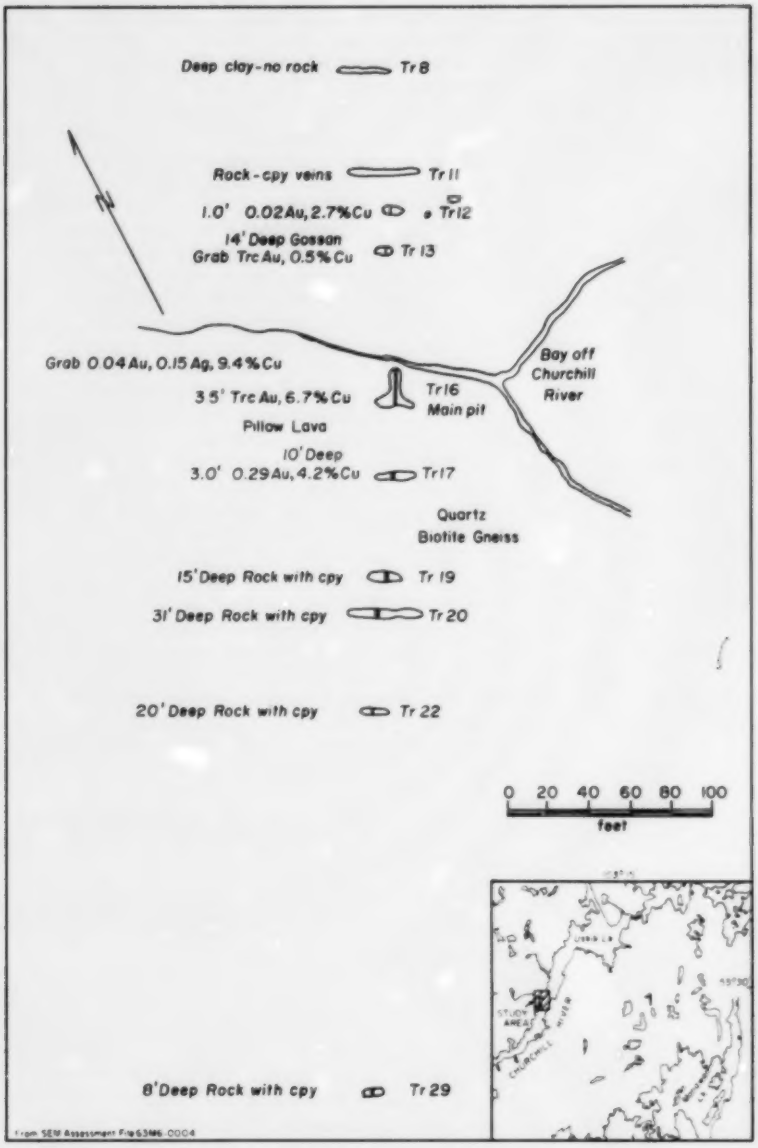


Figure 20 - Sketch map of trenching on the Cam Showing (mineralized zone is shown by solid black lines).

be mineralized. As many as four other sulphide-bearing shear zones occur in the area. They appear to have short strike lengths and their setting is not described (SEM Assessment File 63M6-0004).

Kaz/Ida

Location: On the northwest side of the small amoeboid-shaped lake approximately 3 km northwest of the Wek/Main/Church Showing (No. 3 on Figure 12; UTM co-ordinates 602450 m E, 6156200 m N).

History and Development: The main showing was discovered in 1955 by K. Parada and K. Wierzycki and staked by K. Parada in 1967. Later in the year, in an examination on behalf of Great Plains Development Company, M. Pyke observed that the showing consists of a 61 m by 22.8 m area cut by six trenches exposing disseminations and fracture fillings of pyrite, pyrrhotite, malachite and chalcopyrite (SEM Assessment File 63M11-0014). The trenched area is reported to be underlain by a fine- to medium- grained amphibolite with local concentrations of hornblende and plagioclase porphyroblasts. In late 1967, Parada optioned the property to Cominco who evaluated it with a program of geological mapping, soil sampling, geophysics and diamond drilling (Figure 21). Grab samples from the trenches yielded up to 0.80 percent Cu, 6.9 g/t (0.2 oz/ton) Ag and 0.4 g/t (0.01 oz/ton) Au. The company completed two diamond drill holes totalling 297 m. Drill hole No. 1 intersected two mineralized shear zones; one of which assayed 0.568 percent Cu across 10.5 m and the other 0.56 percent Cu across 9.5 m. In the latter, several narrower 1.5 m intervals assayed up to 20.5 g/t (0.60 oz/ton) Ag and 1.0 g/t (0.03 oz/ton) Au. Drill hole No. 2 has a 0.5 m thick interval that contained 1.89 percent Cu (Ag and Au were not analyzed) and a 1.5 m thick interval that assayed 0.07 percent Cu, 30 g/t (0.88 oz/ton) Ag and 0.7 g/t (0.02 oz/ton) Au (SEM Assessment File 63M11-0021).

The area along the eastern side of the Kaz property was mapped geologically and prospected in 1968 by Great Plains Oil and Gas Ltd.; no significant mineralization was located (SEM Assessment File 63M11-0012). In 1981, SMDC completed geological mapping in the vicinity of the Kaz prospect and took channel and grab samples from trenches over the main showing. Concentrations of elements detected include: Cu—400 to >20,000 ppm, Au—5 to 2990 ppb, Ag—0.4 to 23 ppm, Hg—20 to 740 ppb and F—165 to 1020 ppm (SEM Assessment File 63M11-0035). In 1982, SMDC completed a detailed VLF-EM-16 and proton magnetometer survey in the vicinity of the Kaz Showing. There was no VLF-EM response over the main showing and other anomalies were attributed to lake bottom effects but the showing produced a magnetic signature (SEM Assessment File 63M11-0037). In

1985, Claude Resources staked CBS 7591, which includes the Kaz Showing and optioned the property to Glitter Gold Mines Ltd. In March 1986, the company completed another magnetometer and VLF-EM survey on a grid over the main showing and prospected the area (SEM Assessment File 63M11-0038). Results of this work were similar to those obtained in the SMDC survey. During the summer of 1986, Mascot Gold Mines (on behalf of Glitter Gold Mines) completed a second phase of exploration that included regional prospecting over all of CBS 7591. In early 1987, Glitter Gold Mines terminated its agreement with Claude Resources and ownership of the property reverted back to the latter. CBS 7591 lapsed in August 1989. Subsequently, in 1990, joint venture partners Starrex Mining Corp. Ltd. and American Ore Ltd. staked the Whitford Bay Property (S-99347) which includes the Kaz Showing. In the summer and fall of 1990, Taiga Consultants, on behalf of the joint venture partners completed mapping and prospecting traverses in the vicinity of the Kaz (R. Chisholm, pers. comm., 1991).

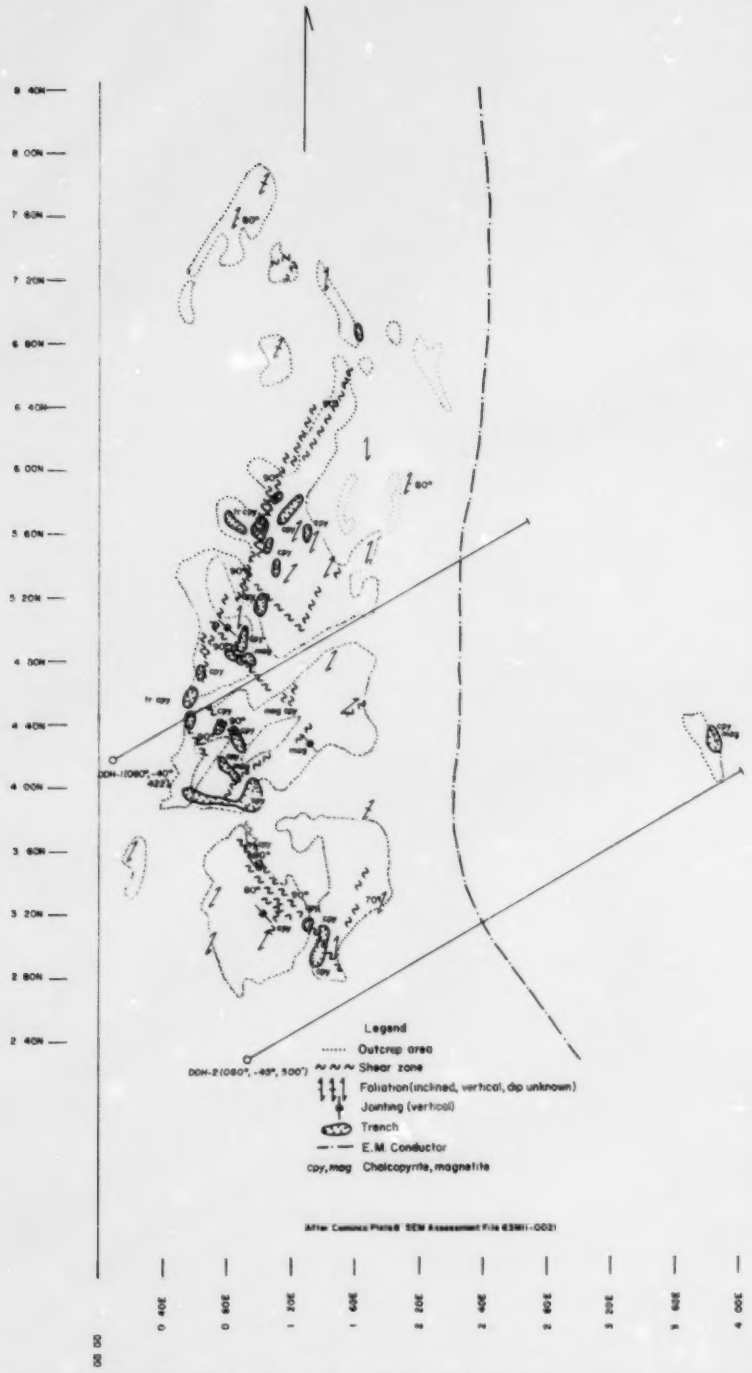


Figure 21 - Outcrop and trench map of the Kaz Showing (spacing between tick marks on the grid is 40 feet).

Geological Setting: The area of the Kaz Showing is underlain by a complex mixture of rock types which include fine- to medium-grained, mesocratic to melanocratic, hornblende-plagioclase rocks, which are interpreted as metavolcanics, feldspar porphyritic granitoids, gabbro and minor volcaniclastics (Figure 12; Delaney, 1987). The Kaz Showing is located along a northeast-trending lineament (SEM Assessment File 63M11-0058).

Characteristics of Mineralization: Two types of mineralization are reported (SEM Assessment File 63M11-0021): 1) fairly widespread disseminations of chalcopyrite and pyrite in feldspar porphyry and hornfels that generally assay 0.2 percent Cu or less; and 2) concentrations of chalcopyrite in quartz and calcite veins in areas of shearing. Sulphide mineralization is found along a conjugate set of fractures or shears that trend 035° and 145° and dip vertically (Figure 21); the 035° trend is the main one. The minimum width of the mineralized area is reported to range from 4.5 to 6 m (SEM Assessment File 63M11-0014). The main showing is reported to consist of lenses of chalcopyrite, magnetite and minor disseminated bornite in a series of narrow *en echelon* shears in a 20

to 30 m wide highly foliated zone in amphibolite gneiss (Figure 21).

Footprint #1, #2 and #3 Shears

Much of the following information was provided by R. Chisholm of Taiga Resources (pers. comm., 1991).

Location: These showings are located approximately 2.5 km north-northeast of the Wek Showing near the small lake, informally named 'Footprint Lake' (Figure 14; UTM co-ordinates: Footprint #1 Shear—605180 m E, 6155805 m N; Footprint #2 Shear—605165 m E, 6155780 m N; Footprint #3 Shear—605070 m E, 6155460 m N).

History and Development: Although the ground covering these showings has been included in various claim blocks over the years, they were not discovered until 1990 after joint venture partners Starrex Mining Corp. Ltd. and American Ore Ltd. staked the Whitford Bay Property (S-99347) which includes the Footprint Lake area. Work during the summer of 1990 included a photogeological lineament study of S-99347 and geological mapping, prospecting, VLF-EM and magnetometer surveys on a grid over the Footprint Lake area. This work included the discovery of eleven sulphide-bearing quartz veins with gold contents between 98 and 11,000 ppb. In the fall of 1990, Taiga Consultants, on behalf of the joint venture partners, completed a follow-up program that included a more detailed photogeological study of S-99347 demonstrating the relationship between some lineaments and gold mineralization. Additional work in the Footprint Lake area included a VLF-EM survey on extensions to the property grid and the discovery, stripping, washing, chip sampling and detailed geological mapping of the Footprint #1, #2 and #3 Shears.

Geological Setting: The trace of the north-trending Uskik Lake Fault is through the middle of Footprint Lake. On the west side of the fault, in the vicinity of the lake, is a dark green, medium-grained, mesocratic gabbro dissected by north-trending shear zones (Delaney, 1987; Chisholm, pers. comm., 1991). On the west side of the Uskik Lake Fault is a sequence of variably altered hornblendic volcaniclastics and sediments. North- and north-northeast-trending quartz veins containing disseminated pyrite and chalcopyrite and anomalous gold contents are common in the vicinity of the Uskik Lake Fault.

Characteristics of Mineralization:

Footprint #1 Shear - This showing, near the northeast end of Footprint Lake, is characterized by a north-trending vertical shear zone in gabbro cut by felsite veins. The shear zone, which is exposed over a length of 5 m on a cliff face, pinches and swells in thickness from 25 to 35 cm, and is characterized by 25 percent ribboned quartz and 5 to 10 percent pyrite stringers in a strongly sheared chloritic rock. Three chip samples across the shear zone, collected over a distance of 2.5 m, contained 12,000 (0.384 oz/ton) to 18,900 (0.604 oz/ton) ppb Au. Gold content of the adjacent gabbro was negligible.

Footprint #2 Shear - This showing, located approximately 15 m northeast of the Footprint #1 Shear, is in one of a series of other narrow shear zones in the area. Mineralization is hosted in a near-vertical shear zone, about 15 cm wide trending 016° across gabbro, with fine-grained mafic volcanic and felsite veins. The shear zone has been exposed for a length of 4 m. Two chip samples across the shear contained 1274 and 4080 ppb Au respectively; gold content of rocks flanking the shear was negligible.

Footprint #3 Shear - This showing, exposed on a vertical cliff face on the southeast shore of Footprint Lake, consists of a 75 to 85 cm shear zone containing anastomosing narrow quartz veins which contain disseminated pyrite and minor chalcopyrite. The zone strikes from 335° to 350° and dips vertically. There are several narrow quartz veins in the gabbro flanking the shear zone. Gold contents of chip samples across the shear zone ranged from 108 to 406 ppb.

In addition to the Footprint Shears, other samples with anomalous gold contents have been collected from the Uskik Lake Fault and in parallel structures on the northwest side of Footprint Lake. These sites require further follow-up to evaluate their economic potential.

Mac's Zone

Much of the following information was provided by R. Chisholm of Taiga Resources (pers. comm., 1991).

Location: This showing is on the southeast shore of the small unnamed lake located approximately 3.5 km southeast of Eisler Lake (Figure 14; UTM co-ordinates 604080 m E, 6160100 m N).

History and Development: Although the ground covering this showing has been included in various claim blocks over the years, mineralization was not discovered until 1990, after joint venture partners Starrex Mining Corp. Ltd. and American Ore Ltd. staked the Whitford Bay Property (S-99347). Work during the summer of 1990 included a photogeological lineament study of S-99347 and selective geological mapping, prospecting, VLF-EM and magnetometer surveys on a grid over the area including and to the south of the Mac's Zone. This work included the discovery of eleven sulphide-bearing quartz veins with gold contents between 98 and 11,000 ppb Au. In the fall of 1990, Taiga Consultants, on behalf of the joint venture partners, completed a follow-up program that included a more detailed photogeological study of S-99347 demonstrating the apparent relationship between some lineaments and gold mineralization.

Geological Setting: This area is underlain by a variably silicified and feldspathized sequence of compositionally layered hornblendic volcaniclastics of the Pine Lake Metavolcanics. These rocks, which strike north and dip steeply to the east, are on the western limb of the nearly isoclinal Carruthers Lake syncline which plunges moderately to the north (Budding and Kirkland, 1956; Delaney, 1987). The volcaniclastics are bounded to the west by generally massive, leucocratic tonalite.

Characteristics of Mineralization: This showing is characterized by a 3 m wide (minimum) north-trending shear zone containing silicified sericite schist with disseminated pyrite and trace amounts of arsenopyrite and fuchsite. The shear zone is bounded on the west by a 3 m wide, white quartz vein the western limit of which is the lakeshore. Variably altered hornblendic volcaniclastic, including zones of sericite schist and quartz veining has been traced 50 m to the north disappearing under the lake. The best gold assay was from a 95 cm wide chip sample which contained 3500 ppb Au.

BR-106 Vein

Much of the following information was provided by R. Chisholm of Taiga Resources (pers. comm., 1991).

Location: This showing is located approximately 1.8 km northeast of the Kaz Showing adjacent to a topographic lineament (Figure 14; UTM co-ordinates 603720 m E, 6157550 m N).

History and Development: Although the ground covering this showing has been included in various claim blocks over the years, mineralization was not discovered until 1990 after joint venture partners Starrex Mining Corp. Ltd. and American Ore Ltd. staked the Whitford Bay Property (S-99347). Work during the summer of 1990 included a photogeological lineament study of S-99347 and selective geological mapping and prospecting as well as VLF-EM and magnetometer surveys on grids in the property. In the fall of 1990, Taiga Consultants, on behalf of the joint venture partners, completed a follow-up program that included a more detailed photogeological study of S-99347 demonstrating the apparent relationship between some lineaments and gold mineralization. The BR-106 Vein was discovered during prospecting of one of the lineaments identified in the photogeological study.

Geological Setting: The showing, which is adjacent to a northeast-trending lineament, is in a medium-grained, apparently massive, buff-weathering leucocratic tonalitic intrusion that underlies an area between Gilson Lake and Whitford Bay (Delaney, 1987). The Kaz Showing is near the southern end of this lineament.

Characteristics of Mineralization: Preliminary work has revealed a 30 cm wide northeast-striking quartz vein with an exposed length of 15 m. A grab sample of hematized quartz with minor malachite staining and containing about 1 percent pyrrhotite and trace chalcopyrite contained 4200 ppb (0.122 oz/ton) Au.

Manawan Lake

Manawan Lake Property

Location: Several showings have been identified on the south side of Manawan Lake in the area west of the topographic trace of the Tabbernor Fault; the following UTM co-ordinates are for the approximate centres of the three main areas of mineralization: Western—611980 m E, 6136940 m N; Royex—612420 m E, 6136820 m N; and Main—612800 m E, 6137400 m N.

History and Development: Corona acquired the property in 1987 and obtained a value of 1163 ppb gold from a grab sample during a preliminary evaluation. In June 1988, Taiga Consultants Ltd. were contracted to evaluate the property with a program of reconnaissance geological mapping, prospecting, a VLF-EM survey, and soil/till/rock geochemical sampling. Rock and soil samples were collected from a grid over small composite basic intrusives in the Wood Lake Batholith west of, but adjacent to, the Tabbernor Fault. Anomalous gold values in rock (including four that ranged from 1180 to 7300 ppb) and in soil (including five that ranged from 1000 to 2840 ppb) were obtained from several localities, characterized by northeast-trending vertical shear zones and swarms of quartz veins (SEM Assessment File 63M6-0032). The mineralized areas were further delineated in July 1988 in follow-up work by Taiga that included grid cutting, detailed mapping, prospecting, VLF-EM and magnetometer surveys, in-fill soil sampling and outcrop stripping (SEM Assessment File 63M6-0033). Encouraging results from this program resulted in a second phase of follow-up by Taiga Resources, in September 1988 (SEM Assessment File 63M6-0034). This work, which included additional soil sampling, outcrop stripping, detailed mapping, detailed prospecting, chip and soil sampling, further refined understanding of the distribution and character of the mineralization. Three main mineralized zones were distinguished: Western Zone, Main Quartz Swarm and Royex Quartz Swarm (Figure 22). In early 1989, these zones were tested by fifteen diamond drill holes totalling 1456 m in length. The program included thirteen holes on the Western Zone and one each on the Main and Royex Quartz Swarms (SEM Assessment File 63M68-0038). The latter two holes failed to intersect significant mineralization, but those testing the Western Zone returned encouraging results (particularly the ten holes near the south end of the zone). The drilling intersected narrow quartz and quartz carbonate veins at the north-northeast-trending sheared western contact of the diorite for a strike length of 30 m and yielded weighted averages of as much as 4.8 g/t (0.14 oz/ton) Au over 5.48 m. An area of patchy irregular mineralization adjacent to, but down dip of, the shear zone was traced by drilling for 90 m in a north-northeast direction. Variable grades were obtained; the best intersection was 34.2 g/t (1.0 oz/ton) Au across 0.9 m.

Geological Setting: The showings are hosted in small composite gabbro-diorite intrusions near the eastern margin of the Wood Lake Batholith (Figure 23; Kirkland, 1957, 1976). The Wood Lake Batholith is composed of a spectrum of granitic and granodiorite phases and forms a north-south elongate body about 58 km long and 13 to 16 km wide. A sample collected from the north end of the batholith has yielded a U-Pb zircon age of 1850 +1/-2 Ma (Delaney *et al.*, 1988). Along the eastern margin of the Wood Lake Batholith there is a narrow north-trending belt, mainly mafic volcanics, which have been named the Pine Lake Metavolcanics to the north in the Laonil—Uskik Lakes area (Lewry, 1977; Delaney, 1986, 1987). On the east side of the metavolcanic rocks

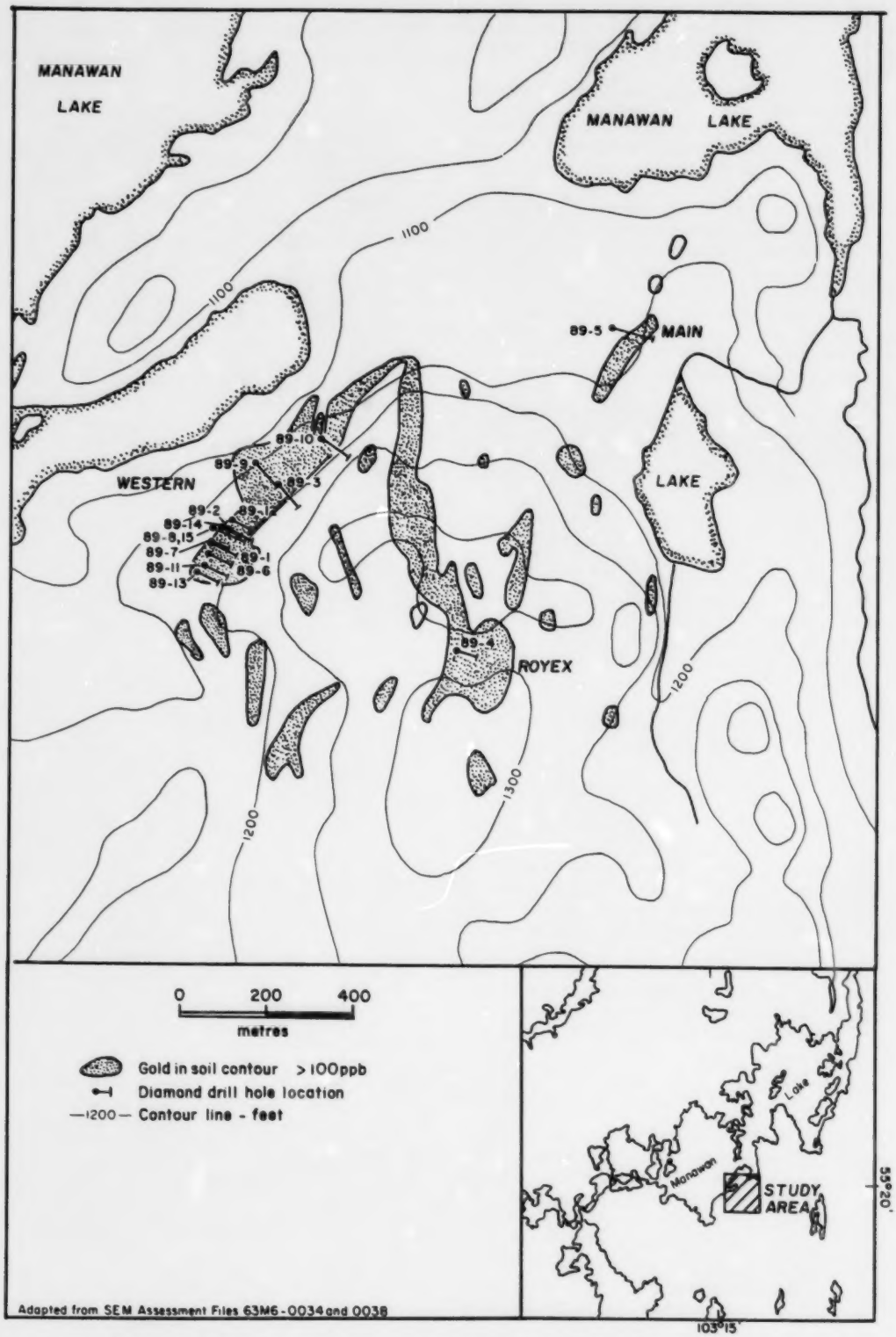


Figure 22 - Gold in soil anomalies and 1989 diamond drilling, Manawan Lake Property.

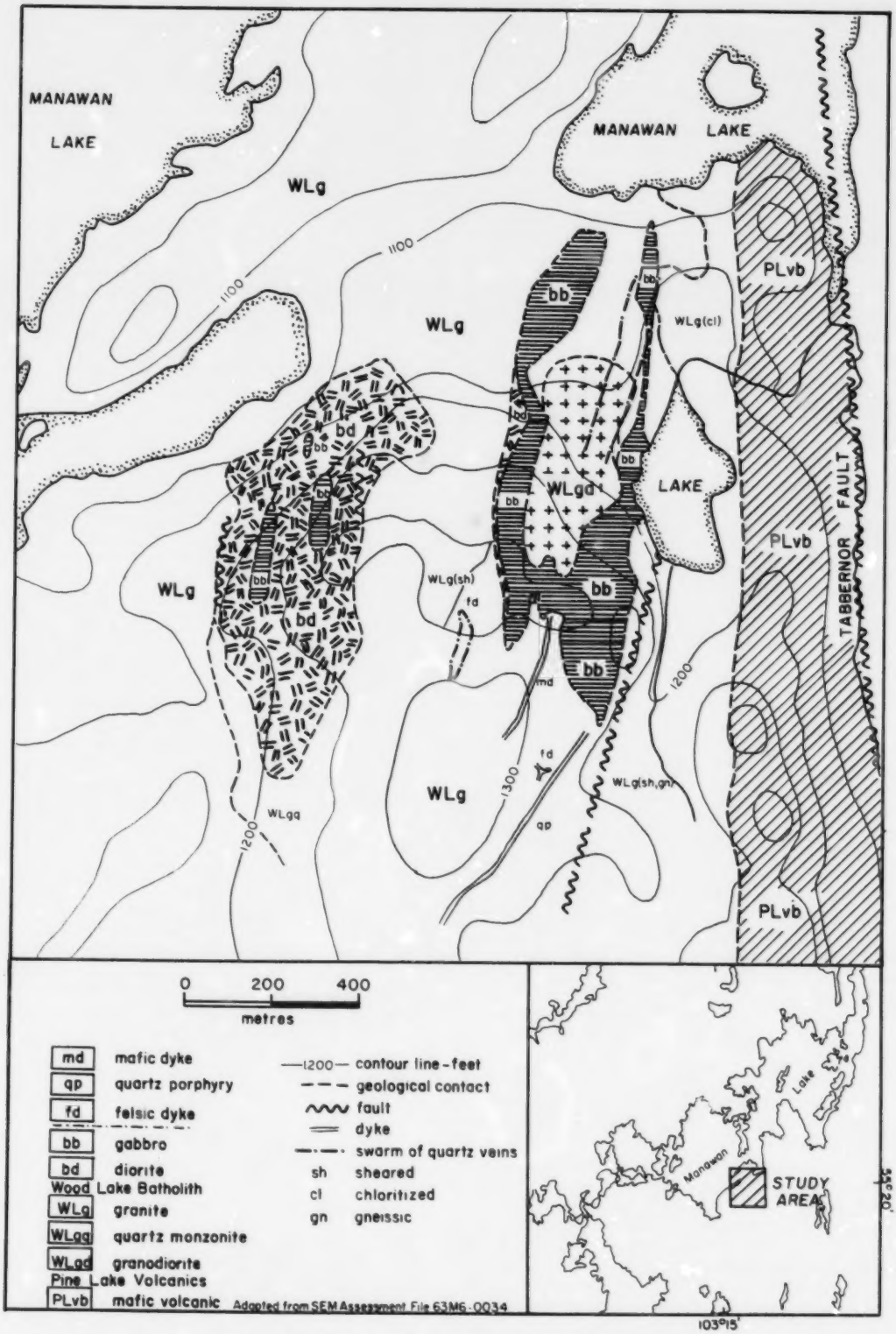


Figure 23 - Geological setting of the Manawan Lake Property.

is a folded sequence of arkose, quartzite and conglomerate, the Ourom Lake Arkoses (Kirkland, 1957, 1976; Delaney, 1987).

The north-northwest-trending trace of the Tabbernor Fault lies within the metavolcanic sequence. Kirkland (1976) noted a 100 to 150 m wide heterogeneous shear zone flanking the trace of the Tabbernor Fault; as well as a 2.5 km wide zone of minor shears, with individual shears ranging from 10 to 150 cm wide, on the west side of the Tabbernor Fault in the Wood Lake Batholith.

Detailed mapping for Corona Corporation indicates that the showing area is underlain by two composite intermediate intrusions mantled, except to the west, by a series of zoned granitoids and granitoid gneisses (Figure 23; SEM Assessment File 63M06-0034). The intrusions are cut by a series of north-northeast-trending, steep dipping shear zones considered to be splays of the Tabbernor Fault. Quartz veins and dykes of variable compositions are associated with the structures. There is evidence for three episodes of deformation in the vicinity of the showings. Shearing and associated dyke and quartz vein development is considered to be both syn- and post-deformational.

Characteristics of Mineralization: Two types of gold mineralization have been indentified (SEM Assessment File 63M6-0034). One variety is auriferous quartz veins in north- to northeast-trending shear zones, within and adjacent to lithologically heterogeneous basic intrusions in the Wood Lake Batholith (Figure 23). Quartz veins are of varying widths, occur singly and in swarms, but not all are mineralized. The second variety is gold-bearing north- to northeast-trending felsic dykes including fine-grained quartz porphyry and cherty schist varieties. Although high gold values are present, mineralization is generally patchy and the dykes too narrow to be economically significant.

The 1989, drilling revealed that the shear-zone-hosted, gold-bearing quartz veins can be subdivided into two types at least in the Western Zone (SEM Assessment File 63M6-0038). Type 1 occurs in fine- to medium-grained, sheared diorite gneiss at the contact between granite on the west and porphyritic diorite on the east (see Figure 23). Within this zone, which is up to 5.5 m wide, narrow (1 to 10 mm) quartz and quartz-carbonate veins form up to 10 percent of the rock; fine-grained pyrite and trace chalcopyrite occur as disseminations, vein fillings and smears parallel to foliation. Type 2 mineralization has been traced for approximately 90 m and occurs adjacent to, but down dip of, Type 1 mineralization. It is irregularly distributed as veins and patchy areas of sulphides, silicification and carbonatization (mainly in porphyritic diorite). Sulphides include chalcopyrite, pyrite and pyrrhotite; there appears to be a correlation between gold and chalcopyrite. Grades are variable over generally narrow intervals.

Wood Lake

Wood Lake Gold Property

Location: On the east side of the of the Tabbernor Fault near the southeast end of Wood Lake (UTM co-ordinates 615500 m E, 6124400 m N).

History and Development: In 1973, Kirkland (1976) noted a pyritic, very fine-grained, highly sheared felsic layer in a sequence of sheared hornblendic metavolcanic rocks near the southeast end of Wood Lake. A sample of this layer contained 3.9 g/t (0.113 oz/ton) Au. In 1975, the showing was evaluated by representatives of the Department of Northern Saskatchewan (SEM Assessment File 63M6-0027); gold contents of nine samples ranged from trace amounts to 0.3 g/t (0.01 oz/ton) Au and 13 g/t (0.38 oz/ton) Ag. It was concluded that the extent of mineralization was small and the grades insignificant, although there was uncertainty whether the same site as Kirkland's had been resampled.

Geological Setting: The showing is about 230 m east of the main trace of the Tabbernor Fault in a sequence of sheared, predominantly hornblendic, basic metavolcanic rocks. The horizon hosting the mineralization has been described as sheared fine-grained felsic rock (Kirkland, 1976) and as fine-grained quartz pebble conglomeratic quartzite (SEM Assessment File 63M6-0027). It occurs at the transition between the volcanic succession and units of the Ourom Lake arkose (Budding and Kirkland, 1956; Delaney, 1987). Pyrite occurs in zones within the unit; Kirkland (1976) noted that pyrite is both disseminated and in thin veinlets within fracture and shear planes.

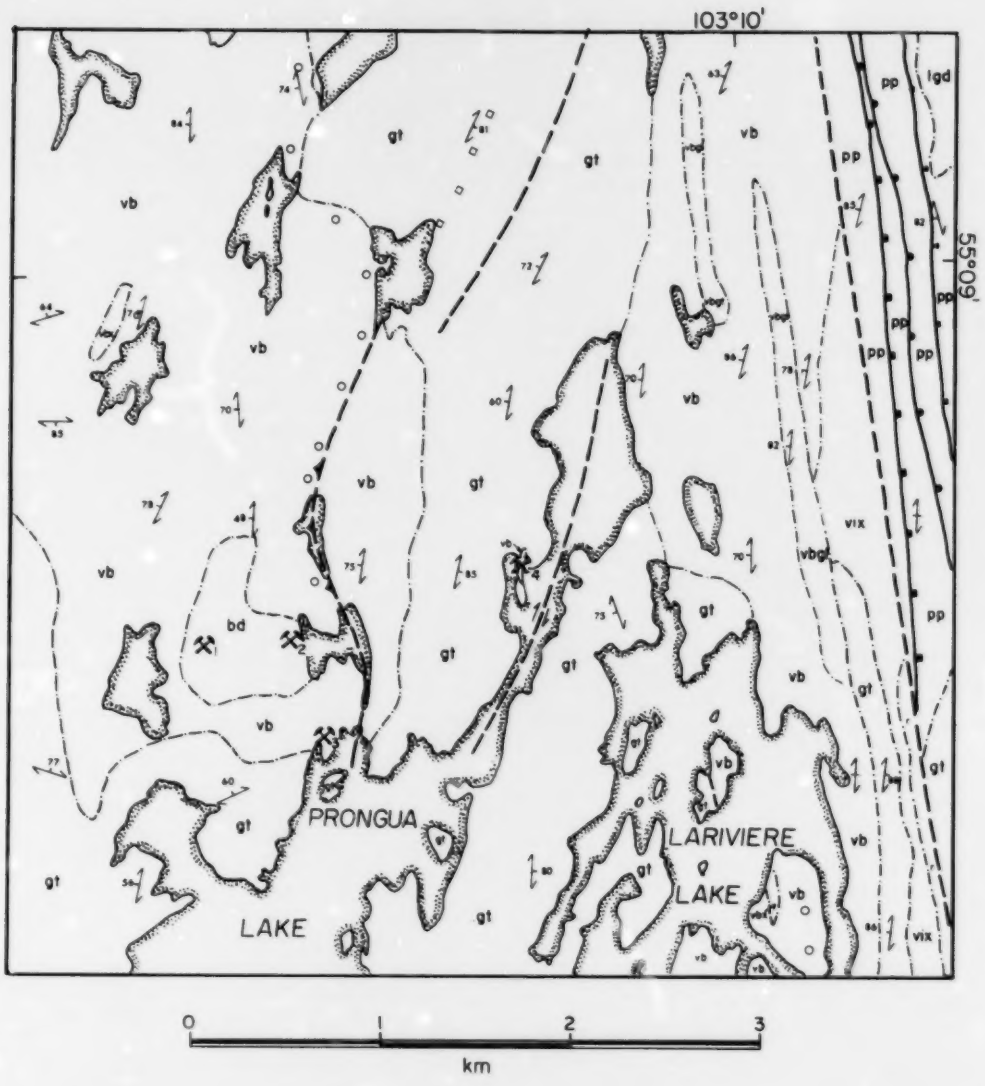
Prongua Lake Area

Four showings were examined during a brief visit to the property during the summer of 1990. They are located on the northwest side of, or to the west of, Prongua Lake. History and development and the description of the geological setting of the showings are combined in the following section but characteristics of mineralization are described separately for each showing. Exploration of the property is in an early stage and the descriptions of showings should be viewed as preliminary.

West Wing Lake, Wing Lake, Prongua Lake and Peninsula Prongua Lake

Location: Names and UTM co-ordinates of these locations are: West Wing Lake Showing (No. 1 on Figure 24; UTM co-ordinates 614050 m E, 6110700 m N); Wing Lake Showing (No. 2 on Figure 24; UTM co-ordinates 614500 m E, 6110650 m N); Prongua Lake (No. 3 on Figure 24; UTM co-ordinates 614650 m E, 6110250 m N); and Peninsula Prongua Lake (No. 4 on Figure 24; UTM co-ordinates 615675 m E, 6111000 m N).

History and Development: Prior to 1972, the area was covered by several airborne geophysical surveys and



lgd	Leucogranodiorite		Geological contact
gt	Tonalite		Foliation inclined, vertical
bd	Quartz diorite/diorite		Fault sense of shear unknown, sinistral strike slip, thrust
pp	Pelite/psammopelite		Mineral showing
vix	Intermediate volcaniclastic		Area of feldspathic and silicic alteration
r	Arenite		Area of epidote alteration
vbx	Mafic to intermediate fragmental		Andalusite isograd
vb	Mafic volcanic		Fibrolite isograd
vbgt	Mafic volcanic with tonalite dykes		Isograd muscovite, plagioclase and quartz pseudomorphs after andalusite

Geology after Wilcox, 1990

Figure 24 - Geological setting of gold showings in the Prongua Lake area.

contained within a number of claim blocks and mineral permits. This work was primarily directed towards the discovery of base metal deposits. In 1972, while mapping the Sandy Narrows (east) map-area (63M-3E), Sibbald (1978) discovered copper mineralization in metavolcanic rocks on the west shore of a small 'winged-shaped' lake approximately 300 m north of the central part of Prongua Lake. Three grab samples collected by Sibbald from this locality, which is referred to informally as 'Wing Lake', contained 0.74 to 1.62 percent Cu, 0.002 to 0.008 percent Zn and 0.2 to 0.3 g/t (0.005 to 0.010 oz/ton) Au. Sibbald also observed other minor occurrences of chalcopyrite and malachite in the vicinity of this showing as well as in metavolcanic rocks on a small peninsula on the west shore of Prongua Lake near the north end of the Lake.

The Prongua property (CBS 7073, CBS 7053, CBS 6554, S-96417 and S-96421) was staked by W. Fisher in 1986 and 1987. Fisher completed prospecting, stripping, trenching and soil sampling around known sulphide showings. Three areas with anomalous concentrations of gold were identified. In early 1989, the property was optioned by Placer Dome Inc. who, later in that year, enlarged the claim boundaries (S-101520 to -101525 and S-101527), stripped some of the showing areas, cut a grid, completed magnetometer and VLF-EM surveys and a geological map of the grid area (Bridge, 1990). The company continued work in the Prongua Lake area in 1990 and 1991; results of this work, which included diamond drilling, are not known.

Geological Setting: The Prongua Lake area was mapped at a scale of 1:63,360 by Sibbald in 1972 and more recently remapped at a scale of 1:20 000 as part of a detailed investigation of geological relationships along the Tabbernor Fault (Wilcox, 1990).

Much of the area to the northwest of Prongua Lake is underlain by fine-grained, dark green mafic volcanics intruded by abundant medium-grained, subvolcanic mafic sills and dykes of various textural varieties (Wilcox, 1990). This sequence has been subjected to amphibolite facies metamorphism and to various types of alteration (Bridge, 1990) and only rarely are primary structures, such as pillows, preserved. The area around Prongua Lake is underlain by a medium-grained tonalite with subordinate phases of gabbro and diorite. As noted by Wilcox (1990, p76): "Mafic inclusions, xenolithic layers and residual rafts are abundant and commonly sites of strain and sulphide mineralization." Northwest of Prongua Lake a multiphase diorite plug containing abundant xenoliths cuts the mafic volcanic assemblage. Copper mineralization has been identified in this intrusive (Sibbald, 1978).

The north-northwest-trending Tabbernor Fault is approximately 3 km east of Prongua Lake. The fault is flanked by a 200 to 1500 m wide heterogeneous strain zone, the Tabbernor Strain Zone. Wilcox (1990) distinguished two main episodes of deformation in the vicinity of the Tabbernor Fault. The first episode of deformation produced a foliation, minor high-strain zones and other heterogeneously developed features. The second episode of deformation deflected earlier structures as well as forming new ones. Within the Prongua Lake area, heterogeneous strain has formed discrete mylonite zones and major northeasterly- trending lineaments whose orientation changes to northerly near the Tabbernor Fault. Wilcox (1990, p81) has summarized the complex evolution of The Tabbernor Strain Zone as follows: "a high angle thrust system which evolved to an open oblique reverse, through a sinistral wrench and finally to a brittle sinistral fault."

Characteristics of Mineralization: The following descriptions are based on a brief property examination by the writer and discussions with K. Wilcox.

West Wing Lake - The main rock type in this area is dark green, medium-grained, massive, mesocratic to melanocratic gabbro. Within the gabbro, a series of pink aplite veins pinch and swell in thickness from a few centimetres to as much as 55 cm and trend approximately north. Some of the thicker veins are layered. The veins are composed mostly of strained quartz and contain minor biotite, amphibole and chlorite concentrated in layers a few grains thick. Also, within the veins are disseminated chalcopyrite, molybdenite and pyrite. Just south of line 62E on the property grid, adjacent to one of the felsite veins, there is a mottled smoky quartz vein with limonitic stained vugs which is approximately 50 cm wide.

Wing Lake - This is where Sibbald (1978) collected the mineralized samples mentioned in the history and development section of the Prongua Lake property report. The showing has been previously described by Wilcox (1990). The area is underlain by a multi-stage heterogeneous diorite with abundant basic intrusive xenoliths. The diorite is cut by a series of north-trending, small scale sinistral shear zones which are probably related to the Tabbernor Fault Zone. Wilcox (1990, p82) noted: "In addition to chalcopyrite and pyrite, pyrrhotite, bornite, magnetite and an unknown copper coloured metallic mineral occur. Mineralization occurs within or adjacent to quartz veins, 1 to 10 cm wide vein-parallel discontinuous stringers and nodular masses. The sulphides are accompanied by calcite and locally epidote. The dominant veins are generally less that 10 cm wide and are composed of grey to white sugary masses of quartz. Veins have a slight left stepping *en echelon* arrangement in an overall northerly strike. Chlorite haloes with a subhorizontal ridging lineation locally surround the quartz veins." Semi-quantitative analyses of the veins revealed anomalous contents of tungsten (K. Wilcox, pers. comm., 1990).

Prongua Lake - This showing has a calcite-epidote alteration halo around a 15 cm wide, northwest-trending shear zone that has been traced for approximately 10 m in mafic metavolcanic rocks. In thin section, the alteration zone is composed of hornblende, epidote and quartz. Some quartz occurs in fine-grained pods. Sulphides occur in vugs in silicate minerals and include pyrite and chalcopyrite. Visible gold is also present.

Peninsula Prongua Lake - Rust weathering, dismembered and boudinaged milky quartz veins occur in a north-trending shear zone at the contact between

tonalite and a raft of mafic volcanic rock. Quartz veins range in width from 5 to 50 cm and have been traced for a strike length of approximately 25 m. There has been apparent dextral movement in the shear zone which is oblique to the contact of the xenolith and tonalite. Quartz veins contain pyrite, pyrrhotite, chalcopyrite, bornite, visible gold, malachite and azurite.

Gee Lake Greenstone Belt

The Gee Lake Greenstone Belt (Slimmon, 1988, 1989) is an assemblage of mafic to intermediate volcanics and minor interlayered felsic volcanics and sediments which are exposed in a wispily-terminated narrow belt that extends southeast from the south side of Sadler Lake to the east of Gee Lake. The volcanics have been subjected to polyphase deformation and metamorphic grade ranges from lower to middle amphibolite facies. The greenstone belt is flanked along the south and east sides by granitoid rocks including the Leuder Lake Batholith (south of Gee Lake) and the Wood Lake Batholith to the northeast. The volcanic assemblage is structurally overlain to the northeast by a thick sequence of metasedimentary rocks. Gold mineralization has been discovered at two localities in the Gee Lake Greenstone Belt. At the HBED Showing, near Nicholson Lake, gold occurs in a massive sulphide body and west of Gee Lake, at the Hook Lake Showing, gold occurs in quartz veins associated with sulphide-bearing veins and disseminations.

Nicholson Lake Area

HBED

Location: Beside an east-trending swampy valley approximately 3.1 km north-northwest of Nicholson Lake (UTM co-ordinates 592090 m E, 6116380 m N).

History and Development: In 1965, in order to evaluate the base metal potential of CBS 764 (SAD 10), northeast of Horst Lake, Hudson Bay Exploration and Development Company completed a horizontal loop survey over two grids on this large claim group. Several conductors were defined and, in 1967, they were tested by 22 diamond drill holes (SEM Assessment Files 63M4-0004 and 63M3-0029). The most encouraging results were obtained from a group of 7 holes (SAD 74-75 and 90-94) collared at the east end of a short, east-southeast-trending weak conductor between two strong conductors (Figure 25). This weak conductor corresponds to the HBED zones. Although all of the holes intersected copper and zinc mineralization (Figure 26), as well as trace amounts of gold and silver, only SAD 75, drilled at the southeast end of the conductor, returned gold values in greater than trace amounts. The best intersection was 0.7 g/t (0.02 oz/ton) Au over 0.4 m; the same interval contained 62.3 g/t (1.82 oz/ton) Ag. In the diamond drill log, this interval is described as quartz-hornblende-biotite-sericite gneiss with 3 percent pyrite and trace sphalerite, chalcopyrite and galena but no values for copper and zinc were recorded in the assays. The showing was restaked in 1983 by a joint venture of Comaplex Resources International (70 percent) and Wapa Minerals Ltd (30 percent). In July 1983, Wapa Minerals undertook geological reconnaissance, bedrock sampling, a lake sediment geochemical survey as well as a thorough review of previous work on the HBED zone. The multi-element lake sediment survey defined several anomalous zones related to two styles of mineralization: 1) stratabound volcanogenic Cu-Zn mineralization, cf. HBED zone; and 2) shear related Au-Cu±Mo, cf. Hook Lake. The most significant of these, from a gold perspective, was an anomaly of Mo, Cu, B, As and Au in lake sediments that defined a north-northwest-trending zone coincidental with lineaments north of Hook Lake.

Geological Setting: The area was mapped at a scale of 1:63,360 during the summers of 1975 and 1976 by Scott (1981). In 1988, Slimmon included it in revision 1:20 000 scale mapping of the Gee Lake area. The showing is hosted in a narrow east-southeast-trending and tapering belt of volcanic rocks flanked by basic to intermediate intrusives (Figure 25; Slimmon, 1988). These rocks have been subjected to polyphase deformation and their metamorphic grade is lower amphibolite facies. The surface projection of the showing is in intermediate volcanic rocks adjacent to, and east of, a lens of felsic volcanics. Coombe and Lorsong (SEM Assessment File 63M3-0029) and Slimmon (1988) consider that quartz sericite schist reported in diamond drill intersections of the showing may be the sheared extension of the felsic volcanics.

Characteristics of Mineralization: The following account of the character of the mineralization is based on information in SEM Assessment File 63M3-0029. The mineralized zone is a tabular body that strikes 100° to 115°, dips 55° north and plunges 45° to 55° west (Figure 26). The zone consists of disseminated to locally massive sulphides that include pyrite, pyrrhotite, sphalerite, chalcopyrite and galena in a quartz sericite schist. Intervals containing greater than 2.5 percent combined copper and zinc range from 0.8 to 6.5 m, and average about 4.6 m in true thickness. Lower grade copper-zinc mineralization flanks this zone on both the hanging wall and footwall. Although the full dimensions of the mineralized zone have yet to be determined, a preliminary estimate is that it contains a minimum of 650,000 tons grading 0.5 percent Cu and 3.0 percent Zn.

Gee Lake Area

Hook Lake

Location: Approximately 2 km west-southwest of the western side of Gee Lake (UTM co-ordinates 600260 m E, 6114900 m N).

History and Development: Early in the spring of 1968, A.L. Parres on behalf of Guggenheim Exploration Co., completed a Ronka 876 electromagnetic survey over 64 miles of cut grid on the Hook claims and a portion of CBS 859 which encompasses the Hook Lake area (SEM Assessment File 63M3-0019). This work identified several strong, short, northwesterly-trending conductors that dip to the north (Figure 27). During the summer of

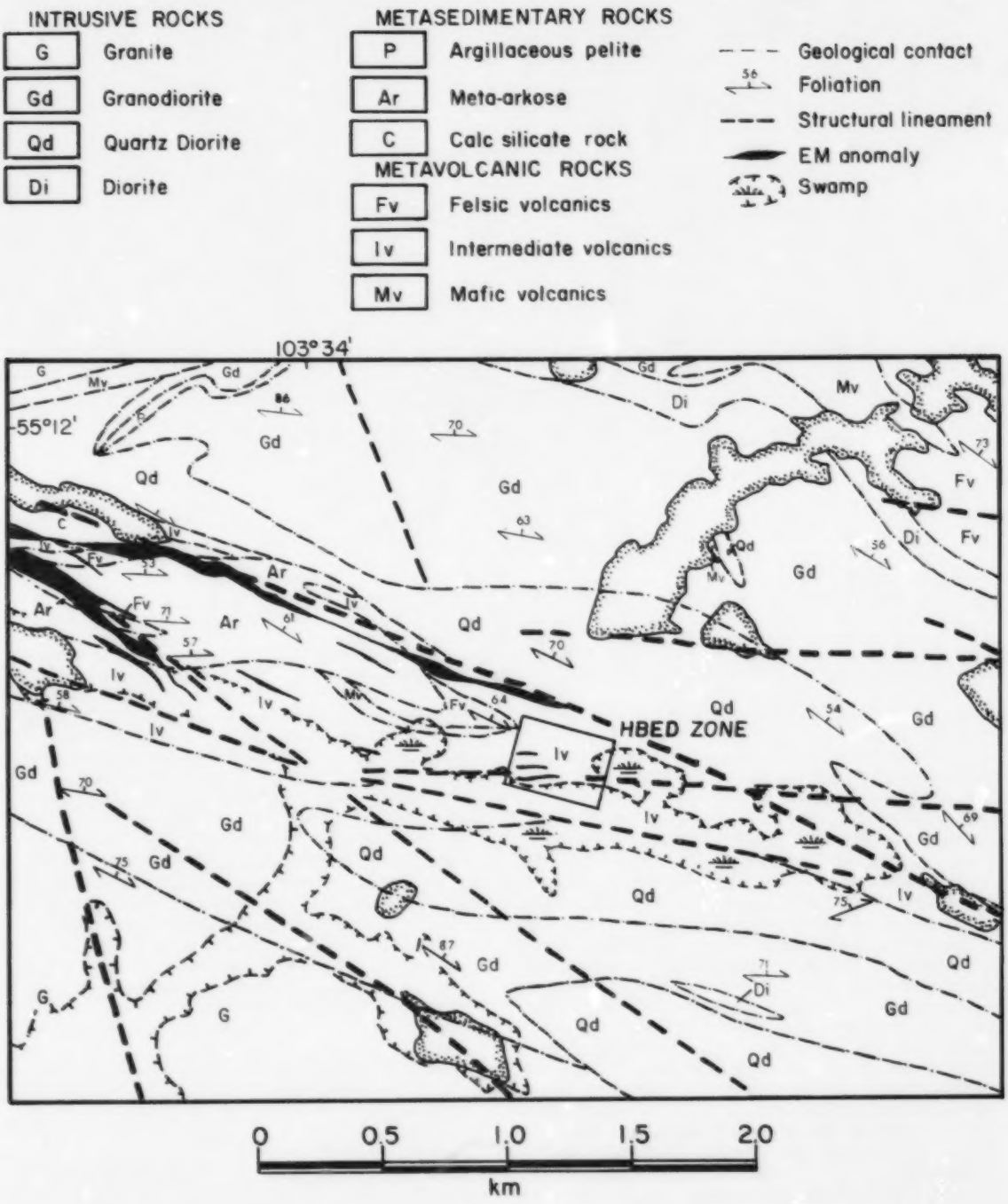


Figure 25 - Regional EM conductors and geological setting of the HBED Showing. Geology after Slimmon, 1988; EM anomalies from SEM Assessment File 63M4-0004.

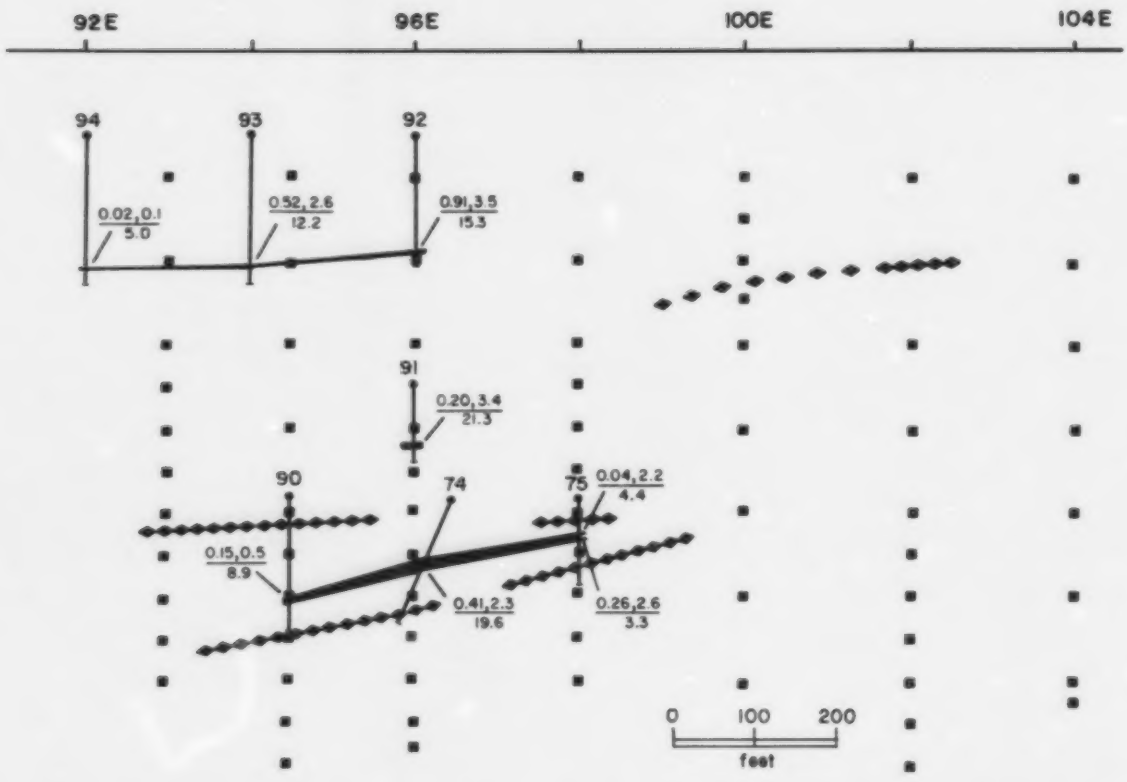
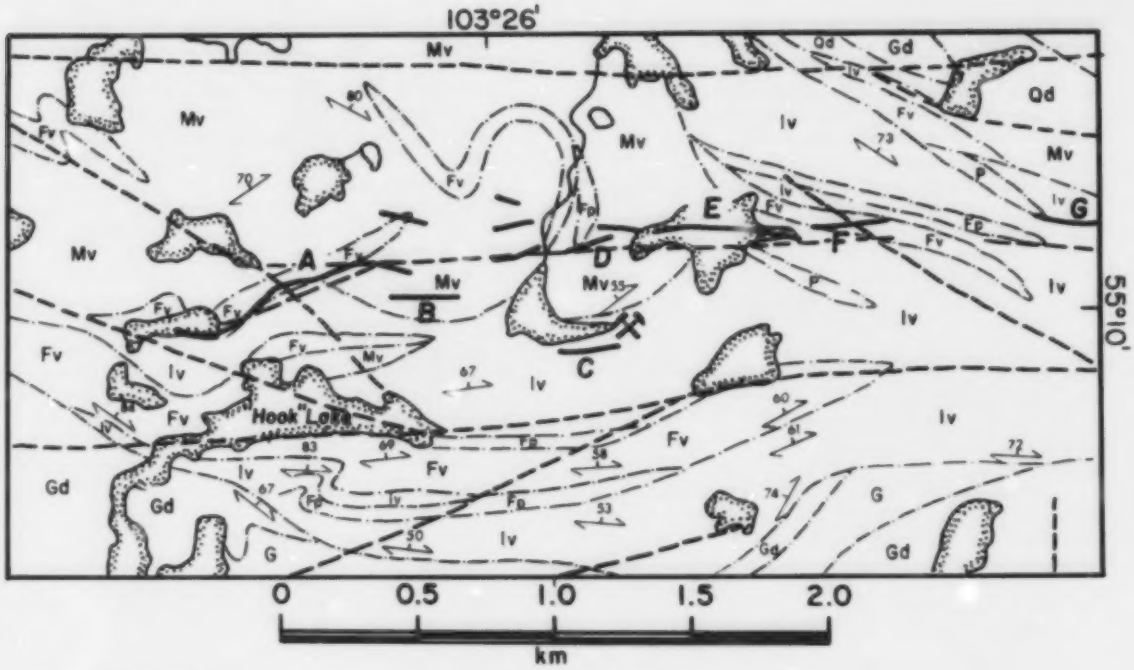


Figure 26 - EM conductors and diamond drill intersections of mineralization on HBED Showing. EM survey stations are indicated by solid squares; well defined conductors are indicated by solid diamonds (wider spacing indicates poorer definition). Diamond drill holes and intersections are projected vertically to surface. All intersections (solid black) lie in a plane approximated by 115°/55°N; deeper intersection (northernmost) appear thinner partly as a consequence of steeper dip. Intersections are shown as percent Cu, percent Zn/core length (feet) (from Figure 3; SEM Assessment File 63M03-0029).

1968, drill testing of these conductors was started. Holes 3, 4 and 5 which tested anomalies E, D, and C respectively, intersected numerous generally narrow sulphide-bearing zones in quartz stringers, silicified patches and disseminations. Pyrite, chalcopyrite, pyrrhotite and less commonly molybdenite (DDH 5) is hosted in a variety of rock types including hornblende schist, quartz-biotite-hornblende schist and diorite. Several narrow intervals were assayed and many of these returned values in copper, gold, silver, and less commonly nickel and molybdenite. On the basis of this drilling, in the fall of 1968, a Sharpe SE 300 vertical loop ground electromagnetic survey was completed on 30 miles of additional grid cut over the mineralized area, at an orientation more perpendicular to strike than the previous grid. This work defined several east- to east-southeast-trending anomalies on the north half of the property and also provided more details of the mineralization intersected in DDH 3, 4, and 5. A group of these conductors were drilled tested but contained mostly iron sulphides. In addition eight diamond drill holes (X1 to 3 and X13 to 17) were collared on anomaly C (Figure 27) to test mineralization intersected in DDH 5. These holes intersected many narrow zones in hornblende schist containing disseminations and stringers of pyrite, pyrrhotite and chalcopyrite and rare flakes of molybdenite. Assay results reported for several narrow intervals (0.18 to 1.98 m) from these cores ranged as follows: 0.05 to 4.74 percent Cu, nil to 2.1 g/t (0.06 oz/ton) Au, trace to 30.1 g/t (0.88 oz/ton) Ag, 0.02 percent to 0.05 percent Ni, and nil to 0.07 percent Mo.

During the winter of 1980-81, Hudson Bay Exploration and Development cut a new grid and completed an electromagnetic survey over the area at the north end and to the east of Hook Lake (SEM Assessment File 63M3-0027). This survey utilized different coil separations and frequencies from earlier work in order to better clarify the character of previously identified anomalies. This geophysical survey was followed up by three diamond drill holes (GRE 1 to 3) that totalled 195 m in length. The drilling intersected intervals containing up to 15 percent iron sulphides as disseminations, stringers and in quartz veins, however, other than a minor amount of sphalerite in one narrow interval, no significant mineralization was intersected.

Geological Setting: Most of the area around Hook Lake is underlain by a sequence of mafic to felsic volcanics that has been subjected to polyphase deformation (Slimmon, 1988; Figure 27). To the east of Hook



Geology after Simmon, 1988 / EM anomalies from SEM Assessment File 63M3-19

Figure 27 - Geological setting and EM conductors, Hook Lake Showing.

Lake there are a series of predominantly east-trending lineaments, some of which are defined by electromagnetic anomalies. Other electromagnetic conductors near Hook Lake correspond to felsic volcanic horizons. To the west of Hook Lake, the trend of the major lineaments changes to northwesterly and can be traced for several kilometres to the Sadler Lake area.

Brownell–Wapawekka Lakes Greenstone Belt

The east-trending Brownell–Wapawekka Lakes Greenstone Belt consists of an assemblage of supracrustal and granitoid rocks which has been subjected to amphibolite facies metamorphism (Figure 28). In the Brownell Lake area, supracrustal rocks are subdivided into two main assemblages: The Brownell Lake Group and the Wapawekka Lake Formation. The Brownell Lake Group consists of both volcanic and sedimentary rocks. Volcanic rocks include mafic to intermediate flows and associated intrusives together with volcaniclastics which predominate over felsic volcanics. Pelitic schists, with minor intercalated conglomerates, are the main sedimentary rocks. The Wapawekka Lake Formation, which is exposed in a belt that extends along the north side of Wapawekka Lake to the west end of Brownell Lake, consists of arkose, grit and conglomerate. In the Wapawekka Lake area, the supracrustal assemblage is subdivided into three formations that compose the Wapawekka Lake Group. At the base, the Wapawekka Narrows Formation consists mostly of mafic to intermediate volcanic and volcaniclastic rocks. The Churchman Island Formation, the middle part of the group, consists mainly of volcanic and volcaniclastic rocks. The upper part is the aforementioned Wapawekka Lake Formation. Relationships between the Brownell Lake Group and the Wapawekka Lake Group are equivocal. The Brownell–Wapawekka Lakes Greenstone Belt contains small syn- and post-volcanic intrusions and is bounded along much of the north and south sides by granitoid rocks (Delaney, 1988, 1989; Padgham, 1968;

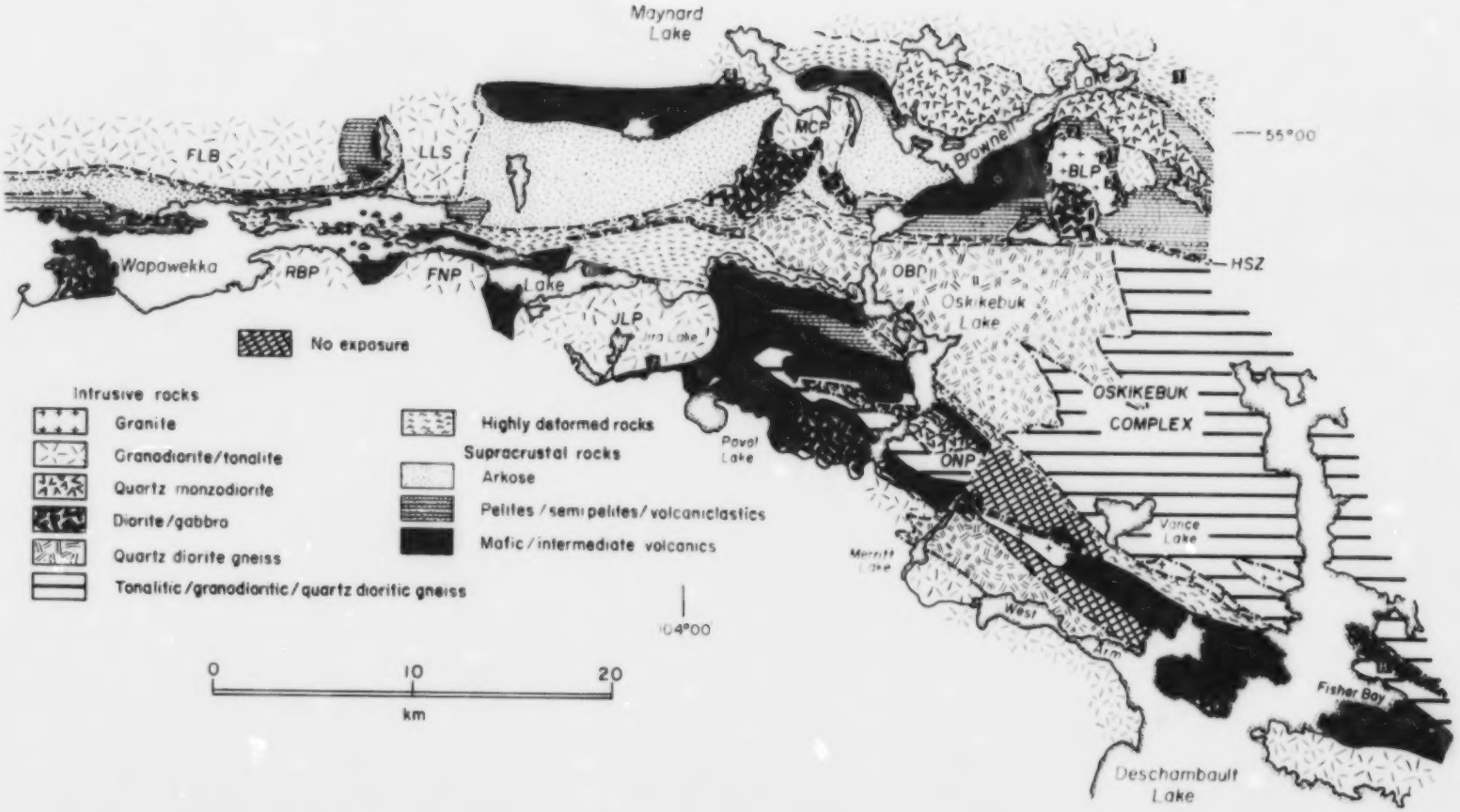


Figure 28 - Geological sketch map of the Brownell, Wapawekka, Oskikebuk and Deschambault Lakes area. BLP = Brownell Lake Pluton; FLB = Folkerson Lake Batholith; FNP = Fisher Narrows Pluton; HSZ = Hartley Shear Zone; JLP = Jira Lake Pluton; LLS = Lacey Lake Stock; MCP = Maynard Creek Pluton; ONP = Oskikebuk Narrows Pluton; OBD = Oskikebuk Quartz Diorite Gneiss; and RBP = Radar Bay Pluton. Gold showings: 1 = Brownell Lake Property; 2 = Showings at the margin of the Brownell Lake Pluton; 3 = Shear zone hosted showings in volcanics of the Brownell Lake Group; 4 = Alex Showing; 5 = M-10 Showing; 6 = Wapa 13 Showing; 7 = Jira Lake Showing; and 8 = Des 111 Showing. In some cases more than one showing is represented by a single symbol.

Scott, 1981). High strain zones occur along the contact with these bounding granitoid rocks and within the greenstone belt. The high-strain zones are of variable thickness, bifurcate and contain a variety of highly deformed rock types. At least two major episodes of deformation have affected these rocks. The first (D1) formed a steeply dipping, east-west-trending foliation and moderate north-northeasterly-plunging stretching lineation. The second (D2) formed north- to northwesterly-trending open folds.

Gold occurs in three settings in the Brownell–Wapawekka Lakes Greenstone Belt: 1) as a subsidiary phase with massive sulphides (e.g. Brownell Lake Property); 2) in or adjacent to high-strain zones (e.g. Emco, Olson, M-10 and Wapa 13); and 3) at the margins of the post-supracrustal Brownell Lake Pluton (e.g. Jena, Kalix and Point). Most showings are in the Brownell Lake area and a few occur in the vicinity of Maynard and Wapawekka Lakes.

East Brownell Lake Area

Gold occurs as a subsidiary phase in massive sulphides on the Brownell Lake Property, east of Brownell Lake, but most gold showings are on the south side of Brownell Lake (Figure 28) where they occur in two distinct settings: within or adjacent to high-strain zones; and near the margins of the post-volcanic Brownell Lake Pluton.

Brownell Lake Property

Location: Approximately 2.2 km east of Brownell Lake (Figure 28; UTM co-ordinates 588270 m E, 6097740 m N).

History and Development: INCO staked the property in 1958 after defining a 1829 m long east-trending airborne EM and magnetic conductor during a regional airborne survey for the purposes of defining Cu-Ni mineralization. During the period 1960-1963, the company completed ground EM and magnetic surveys as well as 22 diamond drill holes totalling 3080.5 m (SEM Assessment File 63M4-0001). The drilling defined a zone for a strike length of 2622 m containing various amounts of chalcopyrite and sphalerite at an average depth of about 64 m. Ten of the holes intersected massive sulphides ranging from 0.82 to 5.85 m in core length and the remainder intersected stringer and disseminated sulphides. The best intersection is reported to be 0.53 percent Cu and 3.2 percent Zn over a true thickness of 5.03 m (SEM Assessment File 63M4-0022). The company estimated the showing to contain 1.40 million tonnes (1.38 million tons) grading 1.75 percent Zn and 0.56 percent Cu (SEM Assessment File 63L13-0036). No gold assays are reported.

In 1969, INCO dropped the property and it was staked by W.B. Dunlop as CBS 969 and optioned to La Ronge Minerals who completed ground EM and magnetic surveys that defined a conductive zone 2438.4 m long and up to 18.28 m wide (SEM Assessment File 63M4-0016). In 1971, International Obaska Mines Ltd. optioned CBS 969 as well as four claims flanking the group to the east (NEL1 to 4; SEM Assessment File 63M4-0007). Six diamond drill holes totalling 1038.76 m in length were drilled to test the east end of the mineralized zone and to search for mineralization on the small claim block on the east side of the property. All holes contained narrow intersections of copper, zinc, gold and silver mineralization. In a group of four holes that tested the east end of the main conductor, two holes intersected copper-zinc mineralization over widths of 2.50 and 2.74 m; weighted averages from the best hole are 0.48 percent Cu, 2.28 percent Zn, 1.4 g/t (0.04 oz/ton) Au and 6.5 g/t (0.19 oz/ton) Ag over a true width of 2.74 m.

In 1978, as part of a more extensive study of the Maynard Lake and Sandy Narrows (West) map areas, Scott (1981) completed geological mapping and a soil geochemistry survey over the showing area which is characterized by sparse outcrop. In an 1982 re-examination of the property, prompted by Scott's recognition of a volcanogenic host stratigraphy, Wollex Exploration mapped an alteration zone of garnet, chlorite and magnetite underlying the main sulphide zone (SEM Assessment File 63M4-0022) and concluded that the showing was a volcanogenic copper-zinc massive sulphide deposit. Wollex also extended the grid and completed a Max-Min electromagnetic survey over the property.

Geological Setting: Scott (1981; Figure 29) completed detailed mapping of the showing area as part of 1:63,360 mapping of the Maynard Lake–Sandy Narrows areas in 1975 and 1976. Despite poor exposure Scott (1981) mapped a sequence of hornblendic gneisses and associated metavolcanic rocks with intercalated garnetiferous semipelitic rocks. He observed (1981, p10) that the mineralized zone intersected in the International Obaska drilling "is low grade and consists of fine-grained sphalerite and chalcopyrite with minor pyrite, marcasite, pyrrhotite and magnetite in breccia zones that lie within and adjacent to semipelite." In 1987, the area was included in 1:20 000 remapping by Delaney (1987) and interpreted to be underlain by a highly strained sequence of dark green to black, fine-grained, strongly foliated amphibolite that includes mylonite and protomylonite with varying amounts of fine-grained quartzofeldspathic streaks, layers and lenses. Drill core from earlier work was not examined and the presence of the alteration zone defined by Wollex could not be confirmed. It is noteworthy that Wollex reported features consistent with both ductile and brittle deformation in a review of the International Obaska drilling. The Brownell Lake Showing is believed to be a highly strained volcanogenic massive sulphide showing that also contains subsidiary precious metal values but the interpretation is tentative because the data are sparse and the outcrop area is poorly exposed.

South Brownell Lake Area

Several gold showings occur in the area south of Brownell Lake, mainly in the Brownell Lake Greenstone Belt, either near the periphery of the Brownell Lake Pluton or in supracrustal rocks to the west. Figure 30 illustrates the distribution of the showings; names for in-

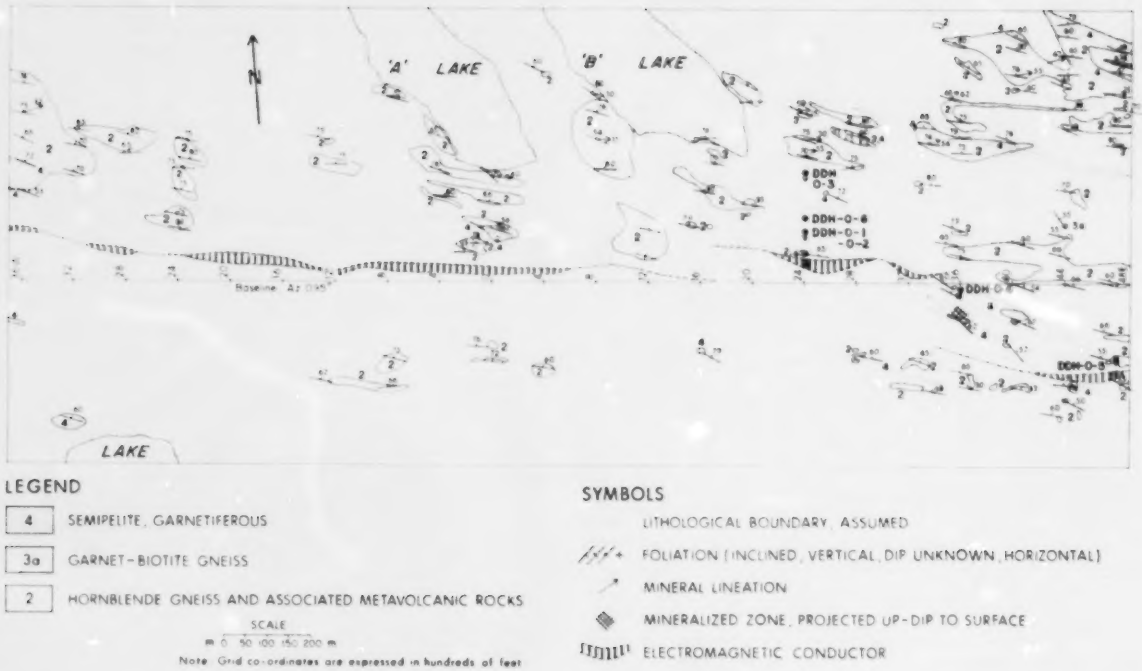


Figure 29 - Sketch map of the geological setting of the Brownell Lake Property. This is Figure 6 of Scott (1981).

dividual showings follow the current terminology of Carina Resources, the owners of the group of claims. Because the history and development of all of these showings is interrelated, this section of the report is combined for all of the showings. The showings are described under two groups: those hosted near the margins of the Brownell Pluton and those within, or adjacent to, high-strain zones in volcanics of the Brownell Lake Group.

History and Development: Although there are reports of earlier prospecting, the first documented work was during the period 1957 to 1961 by the Knox Saskatchewan 1957 Syndicate (SEM Assessment Files 63L13NW-0003 and -0005). This program included mapping, trenching, geophysical surveys and five diamond drill holes. Only one hole, near the Dosco zone (Figure 30) intersected significant gold values; the best intersection was 1.2 m assaying 2.7 g/t (0.08 oz/ton) Au. About the same time, Eric Partridge sampled an outcrop of rusty rock between Havard and Brownell Lakes which assayed 8.6 g/t (0.25 oz/ton) Au.

In 1965, United Comstock Lode Mines drilled one hole near the eastern side of the Emco trend (SEM Assessment File 63L13NE-0007) but no assay values are reported. In 1963, Selco included the Brownell Lake area in an airborne INPUT electromagnetic and magnetic survey that covered 510 square miles (SEM Assessment File 63L13NE-0006) apparently in the search for copper-nickel deposits in ultrabasic rocks. In 1965 and 1966, Selco's ground follow-up included vertical coil EM and magnetometer surveys (SEM Assessment Files 63L13NE-0008, -0009, -0010, -0011, -0012, and -0020). In 1967, at least eight diamond drill holes were collared, including five in Brownell Lake, one in Havard Lake, one northeast of the Olson Showing and one near the Emco Showing. Only the hole in Havard Lake was assayed for copper and nickel.

In 1981, Eric Partridge acquired MPP 1132 which included the previously identified showings at Brownell Lake. In 1982, an intensive, ground exploration program, including Wacker drill soil sampling, focused on a strip in the mafic volcanics between Havard and Brownell Lakes. This work defined six areas of gold mineralization: the Abaco, Dosco, Emco, Olson, Siskin and Talco (Figure 30; SEM Assessment File 63L13-0031). Also during 1982, Partridge formed Carina Mineral Resources Corporation which acquired mineral rights to MPP 1132. Additional prospecting and an expanded Wacker Drill soil sampling program were completed in 1983 resulting in the identification of new zones of mineralization (SEM Assessment File 63L13-0032). In 1984, 22 diamond drill holes were completed on the Emco, Kaldo, Siskin, Spartan and Tuscan zones. Low grade gold values over narrow intervals were intersected in most holes; the most encouraging results were from the linear Emco zone. An expanded prospecting program in 1985 concentrated on the margin of the Brownell Lake Pluton and resulted in the discovery of new showings, such as Jena, Juba and Kalix.

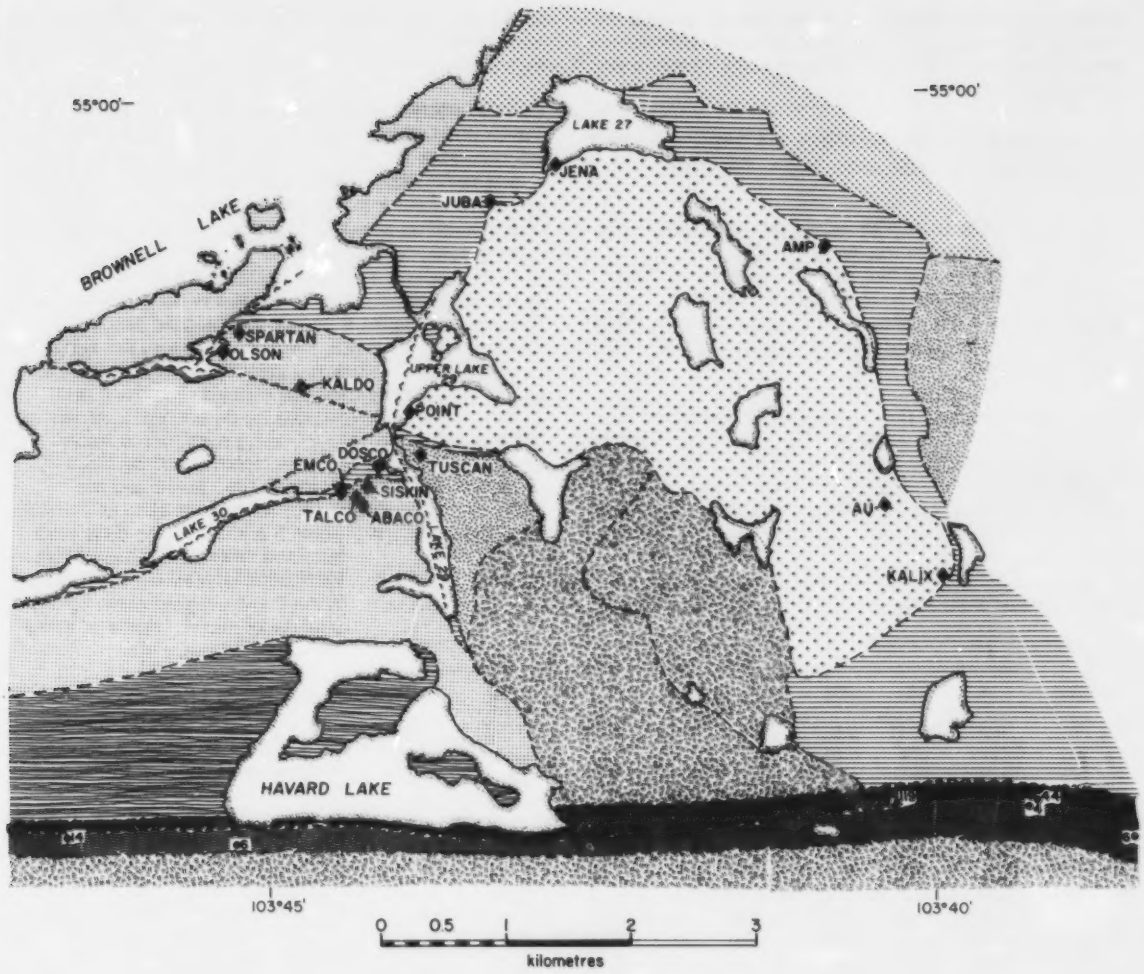


Figure 30 - Locations and geological setting of gold showings in the area south of Brownell Lake. This map also shows gold content of selected rock samples from the Hartley Shear Zone. Gold contents in the Hartley Shear Zone are for the following sample numbers listed from left to right as they appear on the figure: 8822-3088, -338, -1114, -143, -142 and -1133. Additional analytical data for these samples are presented in Table 6.

More recently, an agreement was reached between Carina Mineral Resources and Waddy Lake Resources Inc. whereby Waddy earned a 50 percent interest in the property by completing exploration expenditures totaling $1.25-million. As a part of the agreement, Waddy had a fixed-wing airborne vertical gradient magnetometer and VLF-EM survey flown over the permit area in 1986 by Questor Surveys and undertook additional ground follow-up (SEM Assessment File 63L13-0035). In 1987, Waddy Lake Resources completed 11 diamond drill holes which tested for gold mineralization at the Emco, Jena, Kalix, Talco as well as the granodiorite-hosted Alex zone on Maynard Lake and a geophysical anomaly 4 km south of the western end of Maynard Lake (SEM Assessment File 63L13-0036). This work defined a westward extension to the Emco mineralized zone, which lies in a quartz vein at the fault contact between fine-grained amphibolite in the footwall and staurolite schist in the hanging wall. The best intersection was 1.49 m grading 3.9 g/t (0.114 oz/ton) Au. Drill

tests of the Talco, Abaco, Kalix and Jena showings were not encouraging. Waddy undertook additional ground follow-up during 1988; but results have not yet been reported.

Gold Showings Associated with the Brownell Lake Pluton: Amp, Au, Jena, Juba, Kalix, Point and Tuscan

Locations: Locations of showings are illustrated in Figure 30 (UTM co-ordinates: Amp—584480 m E, 6094170 m N; Au—585020 m E, 6092100 m N; Jena—582390 m E, 6094790 m N; Juba—581790 m E, 6094440 m N; Kalix—585460 m E, 6091500 m N; Point—581240 m E, 6092840 m N; and Tuscan—581240 m E, 6092500 m N).

Geological Setting: The composite calc-alkaline Brownell Lake Pluton dated at 1831 +9/-7 Ma (Delaney *et al.*, 1990) forms the core of an open, northeast-plunging D2 anticline. Seven gold showings have been identified in, or adjacent to, the margins of the northern porphyritic granite part of the intrusion (Figure 30; Delaney, 1988). Gold is hosted in discontinuous quartz veins, some of which have been deformed. None of the showings appear to have significant grades or tonnages.

Characteristics of Mineralization: Most showings in the Brownell Lake Pluton (e.g. Jena and Kalix; Figure 30) consist of localized, irregular networks of narrow quartz veins within a few metres or tens of metres of the periphery of the intrusion. In some cases, more than one generation of quartz is present. Patchy concentrations of arsenopyrite, pyrite and minor chalcopyrite are present in some, but not in all generations of quartz veins. Mineralized quartz veins are enriched in Ag, As, Cu, and Zn (Tables 5 and 6). Erratic gold grades, together with the small, irregular, nature of the showings, indicate that they are unlikely to be of economic significance. The geological context of some of the showings is still unclear; but for others, relationships are better understood. The following synthesis is based on observations of the author supplemented by discussions with industry personnel. Also presented are geochemical analytical data for a small suite of samples from the showings (Tables 5 and 6). These data were obtained as the first phase of an investigation of element associations in the Brownell gold showings. A brief description of some of these showings follows.

Table 5 - Sixteen-element ICP-MS Assay Values for Selected Mineralized Samples from Gold Showings in the Brownell Lake Area. Analyses by Acme Laboratories, Vancouver.

	Sample No. (8822-)							
Element	8	96	136	137	218	387	388	1291
Mo (%)	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001
Cu (%)	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.03
Pb (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Zn (%)	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01
Ni (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Co (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Mn (%)	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.01
Fe (%)	2.40	6.39	2.62	3.57	3.09	0.94	15.14	9.21
As (%)	1.19	7.39	1.40	2.35	3.08	0.02	20.76	10.13
U (%)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Th (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cd (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Sb (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Bi (%)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Au (oz/ton)	0.016	0.013	0.009	0.007	0.815	0.002	0.317	0.022
Ag (oz/ton)	0.02	0.02	0.01	0.03	0.07	0.01	0.44	0.05

Sample Descriptions:

Sample No.	UTM co-ordinates	Showing	Rock Type
822-8	6092270N 581280E	Unnamed	Quartz veinlets containing arsenopyrite, chalcopyrite and pyrite
8822-96	6093300N 579710E	Olson	*En echelon* arsenopyrite-bearing quartz veins in amphibolite
8822-136	6092840N 581240E	Point	Arsenopyrite-bearing quartz vein in shear zone
8822-137	6092840N 581240E	Point	Arsenopyrite-bearing sheared quartz vein
8822-218	6091500N 585460E	Kalix	Arsenopyrite-bearing quartz vein cutting porphyritic granite
8822-387	6092190N 580880E	Siskin	Chalcopyrite and arsenopyrite in quartz, calcite and hornblende veinlets
8822-388	6092190N 580860E	Siskin	Arsenopyrite clots in quartz and calcite veinlets cutting pillowed andesite
8822-1291	6094780N 582390E	Emco	Arsenopyrite vein in amphibolite

Kalix is located near the southeast corner of the Brownell Lake Pluton which forms an irregular intrusive contact with staurolite schist of the Brownell Lake Group. The showing is particularly well exposed in a stripped and sluiced area about 50 by 100 m. The showing consists of an irregular system of quartz veins which pinches and swells in thickness and trends at various orientations at outcrop scale. Preferred orientation of quartz veins is north and northwesterly, parallel to prominent northwesterly shear zones. The veins contain pyrite, arsenopyrite, molybdenite and visible gold. Forty uncut assays of grab samples ranged from 1.8 g/t (0.052 oz/ton) to 105.3 g/t (3.08 oz/ton) Au (SEM Assessment File 63L13-0035). The showing was tested by two drill holes in 1987 (87-5 and -6); but no significant gold mineralization was intersected (SEM Assessment File 63L13-0036).

The *Point Showing* is in a rust-weathering shear zone in the porphyritic granite phase of the Brownell Lake Pluton. Where the showing has been sluiced and stripped, the shear zone is approximately 4 m wide, and appears to be of limited strike continuity as it thins abruptly a short distance

Table 6 - Geochemical Analyses of Selected Rock Samples from the Brownell Lake Area. Data for all elements except gold was obtained by ICP analyses of a 0.500 gram sample digested in nitric aqua regia. For the elements shown in the table, this leach is considered partial for Mn, Fe, Sr, Ca, P, La, Cr, Mg, Ba, Ti, B and W and limited for Na, K and Al. Au analyses is by Atomic Absorption. Analyses by Acme Laboratories, Vancouver.

	Sample No. (8822-)										
	20	142	143	200	243	338	399	1019	1114	1133	3088
Mo (ppm)	1	1	1	1	2	1	1	15	1	1	1
Cu (ppm)	113	155	70	12	3	38	7396	219	350	183	61
Pb (ppm)	2	4	4	2	2	2	42	8	5	2	2
Zn (ppm)	10	96	63	19	3	51	181	392	84	91	32
Ag (ppm)	0.1	0.1	0.1	0.1	0.1	0.2	50.3	0.7	1.5	0.2	0.2
Ni (ppm)	86	3	3	130	2	9	1	69	3	4	16
Co (ppm)	34	5	11	10	1	11	4	15	5	9	14
Mn (ppm)	125	906	518	269	47	278	298	389	1029	868	256
As (ppm)	1210	4	3	5	298	4	118	79	10	2	2
U (ppm)	5	5	5	5	5	5	5	10	5	5	5
Au (ppm)	0	0	0	0	0	0	6	0	0	0	0
Th (ppm)	1	2	1	1	1	1	1	6	2	2	1
Sr (ppm)	16	16	10	1	3	28	3	3	55	12	22
Cd (ppm)	1	1	1	1	1	1	1	1	1	1	1
Sb (ppm)	2	2	2	2	2	2	2	2	2	2	2
Bi (ppm)	2	2	2	2	2	2	75	2	2	2	2
V (ppm)	22	31	45	15	2	35	20	232	21	80	62
La (ppm)	2	16	14	2	3	12	4	19	17	15	9
Cr (ppm)	11	1	1	510	4	13	3	70	3	2	9
Ba (ppm)	14	175	384	19	6	164	50	39	104	310	35
B (ppm)	4	5	2	5	2	6	2	2	3	7	6
W (ppm)	1	1	1	1	1	1	1	1	1	1	1
Au (ppb)	13	44	4	2	132	6	10 215	10	119	6	14
Fe (%)	3.94	4.46	4.1	2.49	0.39	3.94	6.97	4.49	4.2	5.05	4.42
Ca (%)	2.83	0.97	0.89	0.03	0.04	1.3	0.02	0.15	1.67	0.86	1.24
P (%)	0.022	0.069	0.105	0.002	0.005	0.2	0.021	0.05	0.069	0.142	0.149
Mg (%)	0.12	0.6	0.84	1.12	0.04	0.93	0.34	1.24	0.48	0.92	0.85
Ti (%)	0.08	0.3	0.18	0.01	0.01	0.08	0.09	0.26	0.14	0.27	0.05
Al (%)	1.02	1.89	1.64	0.07	0.05	1.22	1.16	1.75	1.52	1.96	1.16
Na (%)	0.04	0.03	0.05	0.01	0.01	0.07	0.01	0.02	0.04	0.04	0.07
K (%)	0.01	1.08	0.67	0.01	0.03	0.24	0.48	1.01	0.55	1.14	0.07

Sample Descriptions:

Sample No.	UTM co-ordinates	Rock Name
8822-20	6093500N 581315E	Sulphidic schist
8822-142	6089690N 586200E	Quartz-feldspar mylonite
8822-143	6089650N 586150E	Quartz-feldspar mylonite
8822-200	6096330N 587740E	Ferrugenous calc-silicate schist
8822-243	6094790N 582390E	Quarz vein, JENA showing
8822-338	6089370N 579830E	Amphibolitic mylonite
8822-399	6097550N 585670E	Gossan, ALEX showing
8822-1019	6094790N 582390E	Sulphidic schist, JENA showing
8822-1114	6089790N 585080E	Quartz-feldspar mylonite
8822-1133	6089450N 587050E	Amp' 'bolitic mylonite
8822-3088	6089390N 578450E	Amphibolitic mylonite

along strike in both directions from the stripped area. The zone contains several sheared, narrow, discontinuous arsenopyrite-bearing quartz veins. Two grab samples collected by the author from the stripped part of the veins contained 0.2 g/t (0.007 oz/ton) and 0.3 g/t (0.009 oz/ton) Au (Table 5). Five samples assayed for E.F. Partridge contained 1.8 g/t (0.054 oz/ton) to 3.1 g/t (0.091 oz/ton) Au (SEM Assessment File 63L13-0035). The higher assay values are reported to be from samples of the shear zone west of the stripped area.

The *Jena Showing*, at the northern contact of the Brownell Lake Pluton, consists of an irregular system of quartz veins in plagioclase porphyritic granite at the contact with biotitic volcaniclastics of the Brownell Lake Group. Quartz veins abruptly decrease in thickness away from the contact. The vein system has been exposed by trenching and sluicing for a strike length of approximately 50 m and varies in width up to 10 m. A suite of 16 grab samples collected by E.F. Partridge assayed 2.4 g/t (0.071 oz/ton) to 32.4 g/t (0.945 oz/ton) Au (SEM Assessment File 63L13-0035). The showing was tested by one drill hole (87-7) in 1987, but no sig-

nificant mineralization was encountered (SEM Assessment File 63L13-0036).

Shear Zone Showings in Brownell Lake Volcanics: Abaco, Dosco, Emco, Kaldo, Olson, Siskin, Spartan and Talco

Locations: Locations are shown on Figure 30 (UTM co-ordinates: Abaco—581750 m E, 6092000 m N; Dosco—580850 m E, 6092280 m N; Emco—582390 m E, 6094780 m N; Kaldo—580350 m E, 6092950 m N; Olson—579710 m E, 6093300 m N; Siskin—580880 m E, 6092190 m N; Spartan—579830 m E, 6093430 m N; and Talco—580730 m E, 6094780 m N).

Geological Setting: Gold-bearing quartz veins are spatially associated with second and third order shear zones cutting mafic to intermediate flow and fragmental volcanic rocks of the Brownell Lake Group (Figure 30; Delaney, 1988). These high-strain zones are related to the Hartley Shear Zone, a major shear zone along the southern side of the Brownell Lake Greenstone Belt.

Characteristics of Mineralization: Vein geometry is varied and there appears to be potential for both significant grades and tonnage. Information about the showings is sparse and only two of the showings are described in the following section.

Emco is the most significant of the showings in volcanic rocks of the Brownell Lake Group. It consists of an arsenopyrite-bearing quartz vein and sheared siliceous rocks at the fault contact of staurolite schist in the hanging wall. As well, foliated mafic volcanics with disseminations and small veinlets of arsenopyrite are found in the footwall. The east-trending fault zone, which hosts this mineralization, coincides with a VLF conductor (SEM Assessment File 63L13-0035) and has a strike length of several kilometres. The slice of staurolite schist has been traced along the eastern end of the fault for 3 km (Delaney, 1988). So far, only the eastern kilometre of the structure has been drilled and only to shallow depths. The best intersections are from a small fan of holes collared on the east shore of 'Lake 30' and include hole 87-3 which intersected 3.6 g/t (0.104 oz/ton) Au over 1.68 m and hole 87-11 which intersected 1.49 m of 3.9 g/t (0.114 oz/ton) Au (SEM Assessment File 63L13-0036). The mineralization is open both to the west and at depth.

At the *Siskin Showing*, anomalous concentrations of gold are found in a number of diverse settings:

1) In strongly foliated amphibolite cut by chalky millimetre-thick veinlets in two intersecting fracture systems. The veinlets are composed of quartz, hornblende, calcite and chalcopyrite. Flecks of arsenopyrite form coatings on both sets of fracture surfaces. A composite grab sample (8822-387; Table 5) contained insignificant concentrations of gold.

2) In pillowed intermediate volcanics cut by veinlets similar to those described in setting 1 but, in addition, containing an irregular network of yellowish-buff quartz, calcite, arsenopyrite and chalcopyrite veins. These veins pinch and swell in thickness, reaching a maximum of about 10 cm. Analysis of a grab sample (8822-388; Table 5) of the veins, which are characterized by clotted concentrations of arsenopyrite, revealed not only their significant enrichment in arsenic but also high contents of gold and silver, as well as slightly elevated concentrations of cobalt and nickel.

3) In a narrow ferruginous shear zone in foliated amphibolite.

Based on work completed to-date, it appears that the most favorable setting for a significant deposit is in mineralized quartz veins in the east-trending fault between the staurolite schist and amphibolite units. From the orientation and nature of the fault, it is believed to be a small thrust fault related to the Hartley Shear Zone. A more detailed analysis of the structural style of the Brownell Lake Greenstone Belt might identify other east-trending fault zones favorable for hosting gold mineralization.

A small group of grab samples of mylonite from the Hartley Shear Zone were analyzed for gold as well as other elements (Table 6; Figure 30). Two of these samples, 8822-142 and -1114, contained significantly anomalous concentrations of gold of 44 and 119 ppb respectively. This part of the Hartley Shear Zone, and its strike continuity, warrants thorough investigation. Similarly, the northern sheared margin of the Brownell Lake Greenstone Belt should be evaluated for its gold potential. On a broader scale, a re-analysis of existing mapping, coupled with airphoto interpretation, might identify other major shear zones in the southern Glennie Domain.

Maynard Lake Area

There are two areas of gold mineralization in the Maynard Lake area: the Alex and the M-10.

Alex

Location: On a small bay on the north side of the narrow western arm of Maynard Lake (Number 4 on Figure 28; UTM co-ordinates 565640 m E, 6097560 m N).

History and Development: The Alex Showing was discovered during regional prospecting in 1986 by Waddy Lake Resources who, together with partner Carina Resources, holds the property covering the showing. Rock samples from the showing are reported to contain 0.1 (0.04 oz/ton) to 35.6 g/t (1.04 oz/ton) Au, and as much as 92.5 g/t (2.7 oz/ton) Ag and 3.10 percent Cu (SEM Assessment File 63L13-0036). A drill hole, (87-8) which tested the down-dip extension of the mineralized zone, intersected a 2.2 m zone containing a 27 cm quartz vein bounded by fine-grained sulphides in granitoid gneiss. This interval assayed 2.7 g/t (0.079 oz/ton) Au. In 1989, as a follow-up to this drilling, Waddy Lake Resources laid out a detailed grid over the showing area, and carried out detailed soil sampling,

geological mapping and a VLF-EM survey. The results of this work are still confidential.

Geological Setting: The showing is in the southern margin of the Maynard Lake Granitoid which underlies the area flanked by the two western arms of Maynard Lake (Delaney, 1989). Near its southern margin the unit is typically cream-weathering, varies from fine- to medium-grained and is composed almost entirely of quartz and plagioclase with only minor biotite. The nature of the intrusion is enigmatic as the ratio of quartz to plagioclase is highly variable over short distances and garnet is erratically distributed. The rock is typically cut by plagioclase veinlets which locally contain clotted biotite. Near the narrows of the southwestern arm of Maynard Lake, the granitoid hosts abundant wispily-terminated, dark grey, fine-grained mesocratic xenoliths. A pronounced rodding is common in most exposures.

Characteristics of Mineralization: The surface expression of the showing is a small gossan zone adjacent to a narrow shear zone in foliated quartzose granitoid. The gossan contains clots of pyrrhotite, chalcopyrite and arsenopyrite. Analytical data for a grab sample from this showing are presented in Table 7 (Sample No. 8822-399).

M-10

Location: In a series of trenches approximately 4 km south of Maynard Lake and about 1.5 km west of the shallow contorted lake on Maynard Creek (Figure 31; UTM co-ordinates 568150 m E, 6091450 m N).

Table 8 - Analytical Data for 1988 Diamond Drill Holes M-10 Showing (George Cross News Letter, No. 26, Feb. 7, 1989).

Hole No.	Intersection (m)	Width (m)	g/t Au
M10-88-2	67.23-69.61	2.38	2.5
incl.	67.23-67.39	0.2	18.6
	74.76-75.31	0.55	3.5
M10-88-3	11.88-13.41	1.5	1.4
	41.08-42.61	1.53	1.5
	64.70-66.69	1.99	3.7
	82.91-84.00	1.09	3.8
M10-88-4	83.69-85.19	1.50	1.4
	123.29-123.90	0.61	5.4

History and Development: The M-10 Showing was discovered in 1988 by Waddy Lake Resources, a joint venture partner of Carina Resources, the current owner of the property which covers the showing. The discovery resulted from follow-up prospecting, trenching and diamond drilling of an east-trending, 700 m long and 460 m wide, gold in soil anomaly over a VLF conductor identified in the 1986 airborne geophysical survey of MPP 1132 (SEM Assessment File 63L13-0035). During the fall of 1988, four diamond drill holes were completed to test the showing. Additional drilling was carried out in early 1989. Analytical data for three drill holes from the first phase of diamond drilling are reproduced in Table 8. Results of the 1989 drilling have not been released.

Geological Setting: On the southeast side of Maynard Lake, the composite Maynard Creek Pluton cores the D-3 north-northeast-trending Maynard Creek Anticline (Figure 28; Delaney, 1988, 1989). The northern part of the intrusion is a buff to pinkish-buff, medium-grained leucocratic granodiorite that has been dated at 1831 +6/-5 Ma (Delaney *et al.*, 1990; McNicoll *et al.*, in press). Diorite to quartz diorite forms the southern part of the Maynard Creek Pluton and consists of two textural varieties. One variety is a medium-grained, mesocratic diorite that is typically massive. The other phase is a diorite to quartz diorite containing scattered medium- to coarse-grained porphyroblasts of hornblende in a fine- to medium-grained groundmass of plagioclase and mafic minerals. These two varieties are intermixed throughout the southern part of the pluton. The pluton is bounded on the south by the Hartley Shear Zone.

Characteristics of Mineralization: The showing is in heterogeneously sheared diorite near the southern margin of the Maynard Creek Pluton (Figure 31). Shear zones vary in width from a few millimetres to a few tens of centimetres and generally trend east with a moderate dip to the

Table 7 - Geochemical Analyses for a Suite of Grab Samples from the Alex Showing, Wapa 13 Showing and Unnamed Locality, Wapawekka Lake Area. Data for all elements except gold was obtained by ICP analysis of a 0.500 gram sample digested in nitric aqua regia. For the elements shown in the table, this leach is considered partial for Fe and W and limited for K. Au analysis is by Atomic Absorption. Analyses by Acme Laboratories, Vancouver.

	Sample No. (8822-)							
Element	399	89	329	330	331	332	333	334
Mo (ppm)	1	2	3	1	1	3	16	26
Cu (ppm)	7396	49	173	300	93	58	216	89
Pb (ppm)	42	14	3	3	7	7	11	6
Zn (ppm)	181	136	59	70	115	21	61	38
Ag (ppm)	50.3	0.4	0.1	0.5	0.1	1.7	1.2	1
As (ppm)	118	12	37	21	7	39	233	669
W (ppm)	1	1	3	1	1	18	2231	13
Au (ppb)	10215	320	30	37	10	260	30	39
Fe (%)	6.97	0.91	2	5.5	5.76	1.68	4.18	1.64
K (%)	0.48	0.1	0.21	0.77	1.35	0.07	0.72	0.06

Sample Descriptions:

Sample No.	UTM co-ordinates	Showing	Rock Type
8822-399	6097550N 565670E	Alex	Gossan
8822-89	6091530N 548090E	Unnamed	Quartz vein in felsite
8822-329	6087645N 558750E	Wapa 13	3 cm wide quartz vein, Trench 1
8922-330	6087645N 558750E	Wapa 13	Foliated quartz vein, Trench 1
8922-331	6087645N 558750E	Wapa 13	Foliated amphibolite, Trench 1
8922-332	6087700N 558970E	Wapa 13	Boudinaged quartz vein, Trench 6
8922-333	6087700N 558970E	Wapa 13	1 cm quartz vein in a schistose fragmental
8922-334	6087700N 558970E	Wapa 13	15 cm wide milky quartz vein

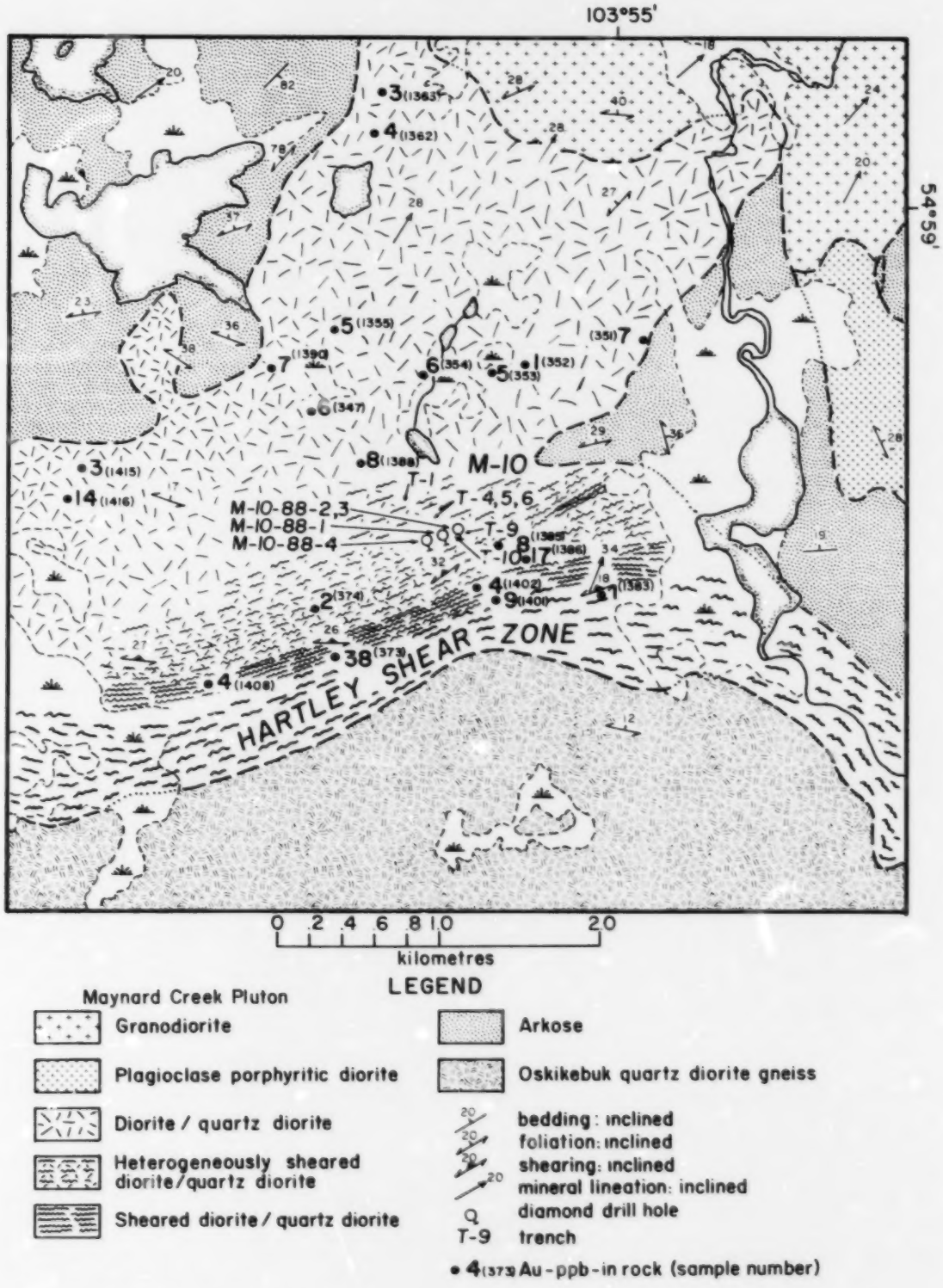


Figure 31 - Geological setting of the M-10 Showing. Additional analytical data for rock samples shown on map plus a suite collected from the trenches are presented in Table 9.

north. Narrow quartz veins of more than one generation pinch and swell in thickness and are aligned parallel as well as at various angles, to the shear zones. Some occur in millimetre-thick shear zones which splay off the main shear at oblique angles. Fine- to medium-grained biotite, feldspar and quartz lenses and veins are also present in the shears. This showing is a few-hundred metres north of a flexure in the Hartley Shear Zone. The narrow shear zones that host the showing are of a similar orientation as the Hartley Shear Zone.

Table 9 contains analytical data for 12 rock samples, 8922-470 to -481, collected from some of the trenches on the showing. The table also contains analyses of sheared diorite collected elsewhere (Figure 31) along the southern margin of the diorite (8922-373, -1401 to -1402, and -1408) and samples of diorite (8922-1362 to -1363 and -1415 to -1416) from other parts of the Maynard Creek Pluton. The latter samples were collected to establish background gold content for the diorite. Comparison of these data indicate the gold content in diorite from outside the southern sheared margin ranges from 3 to 14 ppb. Some diorite and sheared diorite from within the M-10 mineralized zone have gold contents at or slightly in excess of the background values. The highest gold content (2310 ppb) was from a

Table 9 - Geochemical Analyses for a Suite of Grab Samples from the M-10 Showing and Elsewhere in the Maynard Creek Pluton. Data for all elements except gold was obtained by ICP analysis of a 0.500 gram sample digested in nitric aqua regia. For the elements shown in the table, this leach is considered partial for Fe and W and limited for K. Au analysis is by Atomic Absorption. Analyses by Acme Laboratories, Vancouver.

Element Sample No.	Mo (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Ag (ppm)	As (ppm)	W (ppm)	Au (ppb)	Fe (%)	K (%)
8922-470	2	9	3	6	0.3	3	1	49	0.54	0.06
8922-471	3	17	3	5	0.1	5	1	14	0.59	0.04
8922-472	1	33	5	93	0.1	23	1	24	4.45	1.44
8922-473	3	9	4	2	0.1	2	1	4	0.37	0.01
8922-474	1	34	3	112	0.1	23	1	5	3.45	1.12
8922-475	2	58	6	67	0.7	60	6	2310	4.11	1.24
8922-476	2	56	9	54	0.2	20	14	18	2.81	0.85
8922-477	1	53	8	69	0.1	15	1	10	3.96	1.02
8922-478	1	104	2	97	0.2	42	1	14	4.06	1.46
8922-479	2	82	13	104	0.2	50	1	16	4.05	1.27
8922-480	1	23	6	45	0.2	31	1	104	2.28	0.69
8922-481	4	43	2	8	0.1	83	1	18	0.87	0.06
8922-373	1	37	5	85	0.1	85	3	38	3.74	1.43
8922-1401	1	16	7	57	0.4	2	1	9	2.72	1.09
8922-1402	1	42	4	56	0.3	3	1	4	4.04	0.46
8922-1408	1	1	5	81	0.3	78	1	4	3.62	1.9
8922-1415	1	72	2	53	0.4	2	1	3	2.6	1.04
8922-1416	1	54	2	48	0.4	5	1	14	2.53	1.09
8922-1362	2	33	5	65	0.2	3	1	4	3.04	1.07
8922-1363	1	31	5	59	0.1	8	1	3	2.92	0.95

Sample Descriptions:

Sample No.	UTM co-ordinates	Showing	Rock Type
8922-470	6091580N 567880E	M-10	Subvertical quartz vein 6 cm wide, Trench 1 (14.5 m from south end of trench)
8922-471	6091580N 567880E	M-10	20 cm thick quartz pod, Trench 1 (8 m from south end of trench)
8922-472	6091580N 567880E	M-10	Sheared Maynard Creek Diorite - 14 cm thick shear zone, Trench 1 (5 m from south end of trench)
8922-473	6091580N 567880E	M-10	1 to 10 cm thick quartz vein on splay from main shear, Trench 1 (2 m from south end of trench)
8922-474	6091580N 567880E	M-10	Undeformed diorite, hanging wall of shear zone, Trench 1 (1.2 m from south end of trench)
8922-475	6091580N 567880E	M-10	Quartz vein in sheared diorite, main shear, Trench 1 (7.2 m from south end of trench)
8922-476	6091395N 568245E	M-10	Massive undeformed Maynard Creek diorite, Trench 9 (base of trench)
8922-477	6091395N 568245E	M-10	Main shear zone, Trench 9
8922-478	6091260N 568195E	M-10	Hornblende porphyritic diorite, 1.5 m below main shear zone, Trench 10
8922-479	6091260N 568195E	M-10	Sheared diorite, main shear zone (25 cm thick), Trench 10
8922-480	6091260N 568195E	M-10	Quartz veinlets in main shear zone, Trench 10
8922-481	6091510N 568075E	M-10	1 cm thick quartz vein aligned vertical to main shear, Trench 5
8922-373	6090600N 567440E	None	Sheared Maynard Creek Diorite
8922-1401	6090960N 568457E	None	Sheared Maynard Creek Diorite
8922-1402	6091020N 568320E	None	Sheared Maynard Creek Diorite
8922-1408	6090423N 566640E	None	Sheared Maynard Creek Diorite
8922-1415	6091780N 565760E	None	Maynard Creek Diorite (for background)
8922-1416	6091570N 565775E	None	Maynard Creek Diorite (for background
8922-1362	6093850N 567685E	None	Maynard Creek Diorite (for background)
8922-1363	6093125N 567738E	None	Maynard Creek Diorite (for background)

sample (8922-475) of quartz vein in a narrow shear zone in the diorite. The gold content of samples from elsewhere in the sheared southern margin of the Maynard Creek Pluton was generally within background values for diorite although one sample (373) was slightly anomalous at 38 ppb.

Wapawekka Lake Area

Wapa 13

Location: On the north side of the peninsula, on the north shore of Wapawekka Lake, approximately 3.4 km from the east end of the lake (Location 6 on Figure 28; Figure 32; UTM co-ordinates 558980 m E, 6087700 m N).

History and Development: Between 1954 and 1965 the showing was held by four different operators who completed a series of trenches (SEM Assessment Files 73I16-0003, -0004 and -0013; Coombe, 1984). The only assay data reported are those in 1965 by L.A. Lusk, who had a grab sample from Trench 1 assay 17.8 g/t (0.52 oz/ton) Au and an 18.3 m channel sample from Trench 9 assay 4.1 g/t (0.12 oz/ton) Au (Assessment File 73I16-0014). Later in 1968, Lusk drilled three short holes on behalf of the La Ronge Mineral Syndicate in the vicinity of Trench 1. These holes intersected metavolcanics containing arsenopyrite, pyrite and pyrrhotite but did not intersect the mineralized quartz vein exposed in Trench 1.

In 1972, Hudson Bay Exploration and Development Company completed a horizontal loop survey over an extensive area at the east end of Wapawekka Lake including the vicinity of the showing (SEM Assessment File 73I16-0019). The survey defined an east-northeast-trending anomaly on the mainland north of the Wapa 13 Showing (Figure 32) but no response was obtained over the showing. A biogeochemical survey, sluicing, geologi-

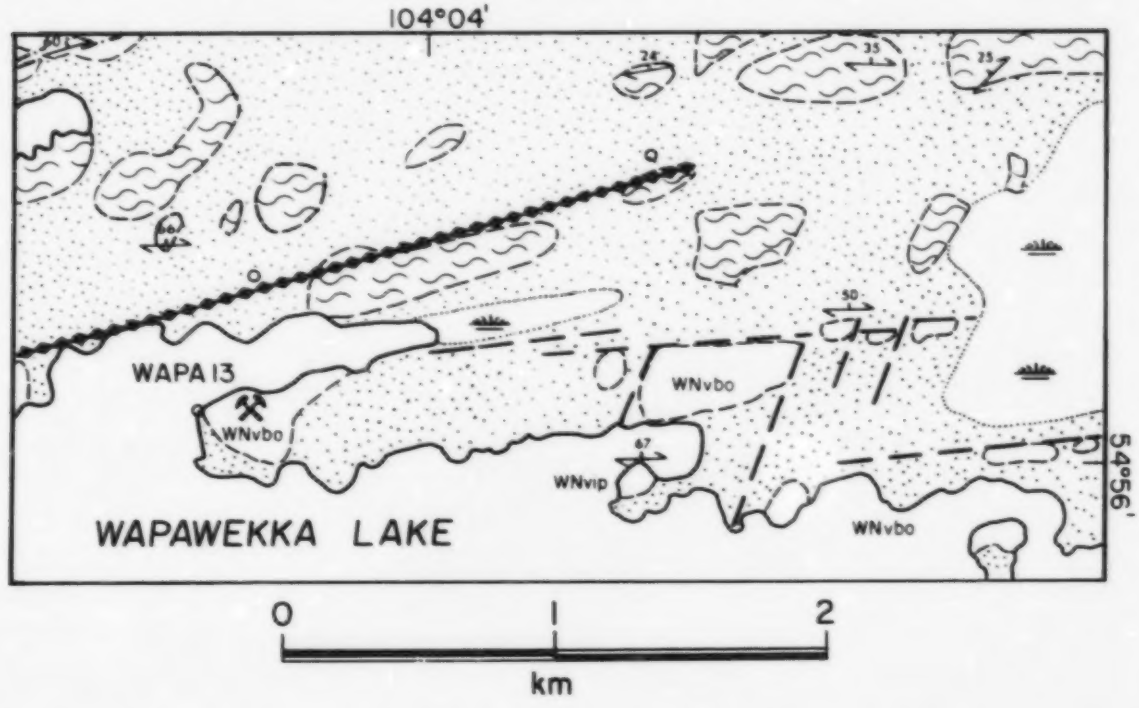


Figure 32 - Geological setting and EM conductors in the vicinity of the Wapa 13 Showing.

cal mapping and sampling were completed on the property in 1989 by Wollex (SEM Assessment File 73I16-0027) but the results of this work are still confidential.

Geological Setting: The north side of the east end of Wapawekka Lake is underlain by a thin sliver of mafic to intermediate volcanic fragmentals, bounded to the north by the wide, but poorly exposed, western extension of the Hartley Shear Zone (Figure 30; Delaney, 1989).

Characteristics of Mineralization: During the summer of 1989, the author visited the Wapa 13 Showing and collected a series of grab samples from some of the old trenches (a map in Assessment File 73I16-0013 shows the trenches referred to in the following discussion) as well as from adjacent, recently stripped areas. The data for these samples (8922-329 to -334) are presented in Table 7. Trench 1 of the Wapa 13 Showing exposes a limonitic quartz vein in a strongly foliated amphibolite. Farther to the west, in the vicinity of trenches 6 to 8, is a sequence of pebble-size volcanic fragmentals, lapilli tuffs, bedded tuffs and hornblende schists. There are a variety of quartz veins in the area of the trenches; some are boundinaged, others parallel foliation and are up to 15 cm in width, and a third variety is narrow, folded and contorted and crosscuts foliation at a high angle. A sample of the boudinaged variety, 8922-332, returned 260 ppb Au, the highest gold value for the suite. A sample of the narrow crosscutting veins (8922-333) has an extremely anomalous W content of 2231 ppm which, moreover, was only subjected to a partial acid leach before analysis. Table 7 also illustrates that Ag, As, Cu, W and Fe are associated with gold in the Wapa 13 Showing.

Oskikebuk–Deschambault Lakes Greenstone Belt

Remnants of volcanic and sedimentary rocks, the Oskikebuk Lake Group (Padgham, 1968; Delaney; 1991) form a northwest-trending belt along the southern margin of the Oskikebuk Complex between Fisher Bay on Deschambault Lake and Jira Lake near the southeast end of Wapawekka Lake (Figure 28). Recent investigations have revealed that significant parts of the belt consist of highly strained rocks (Lewry and Macdonald, 1988; Delaney, 1989). A similar high-strain zone along the northern margin of the Oskikebuk Complex, the Hartley Shear Zone, played an important role in controlling the distribution of gold showings in the Brownell Lake Greenstone Belt (Delaney, 1988, 1990a, b). There are two structurally controlled gold showings in rocks adjacent to the greenstone belt: Des 111 and Jira Lake.

Deschambault Lake Area

Des 111

Location: Mineralization was intersected in a diamond drill hole collared on the north side of Fisher Bay, Deschambault Lake (Figure 28; UTM co-ordinates 599650 m E, 6068460 m N).

History and Development: Between March 1972 and January 1973, Hudson Bay Exploration and Development Company Limited completed horizontal loop EM surveys over 105.75 line kilometres on a series of grids on CBS 2180, 2181, 2182 and claims Des 25 to 28 and Des 112 to 119 on the north side and to the southeast of Fisher Bay on Deschambault Lake (SEM Assessment Files 63L11-0002 and 63L14-0018). This work identified a series of east-southeast- to southeast-trending conductors. Five of these conductors, on the north side of Fisher Bay, were subsequently tested with diamond drill holes in 1974 and 1976 (SEM Assessment Files 63L14-0017 and -0018). Hole Des 111 intersected banded hornblende-biotite-quartz granulite between 30.48 and 53.37 m containing several pyrrhotite-bearing siliceous intervals. One of these, between 46.45 and 46.60 m, contained 75 percent pyrrhotite and assayed 0.7 g/t (0.02 oz/ton) Au and 6.2 g/t (0.18 oz/ton) Ag. Some of the other holes intersected minor amounts of Cu and Zn mineralization but contained no precious metals.

Geological Setting: Mapping by Padgham (1968) revealed that the area north of Fisher Bay, along the southern margin of the Oskikebuk Complex, is underlain by a series of southeast-trending belts composed of quartz-feldspar-biotite granite gneiss, leucocratic granite gneiss, migmatitic hornblende gneiss, biotite-rich schist, gneiss and granulite and fine-grained quartz-rich gneiss and granulite. There are several southeast-trending high-strain zones within these rocks (Delaney, 1991).

Jira Lake Area

Jira Lake Showing

Location: Approximately one kilometre east-southeast of the south end of Jira Lake (Figures 28 and 33; UTM co-ordinates 561120 m E, 6082390 m N).

History and Development: The showing was discovered by D. Partridge during the spring of 1991. The only evaluation work has been trenching and minor outcrop stripping.

Geological Setting: The showing is in west-northwest-trending shears (Figure 33) near the southern contact of the Jira Lake Pluton (Padgham, 1966a, 1968; Delaney, 1989, 1991), a leucocratic to locally mesocratic, plagioclase porphyritic tonalite. Hornblende porphyroblastic amphibolite of the Oskikebuk Lake Group (Padgham, 1968) occurs along the south side of the pluton and as xenoliths near its southern margin.

Characteristics of Mineralization: Gold occurs in narrow, discontinuous, vuggy pyritic quartz veins within at least three west-northwest-trending, dextral shear zones that dip moderately to the north. In the most southerly of these shear zones, the only one which is fairly well exposed, four quartz veins occur in 30 cm of sheared tonalite. Grab samples of the quartz veins contained from 300 to 8700 ppb Au (Table 10).

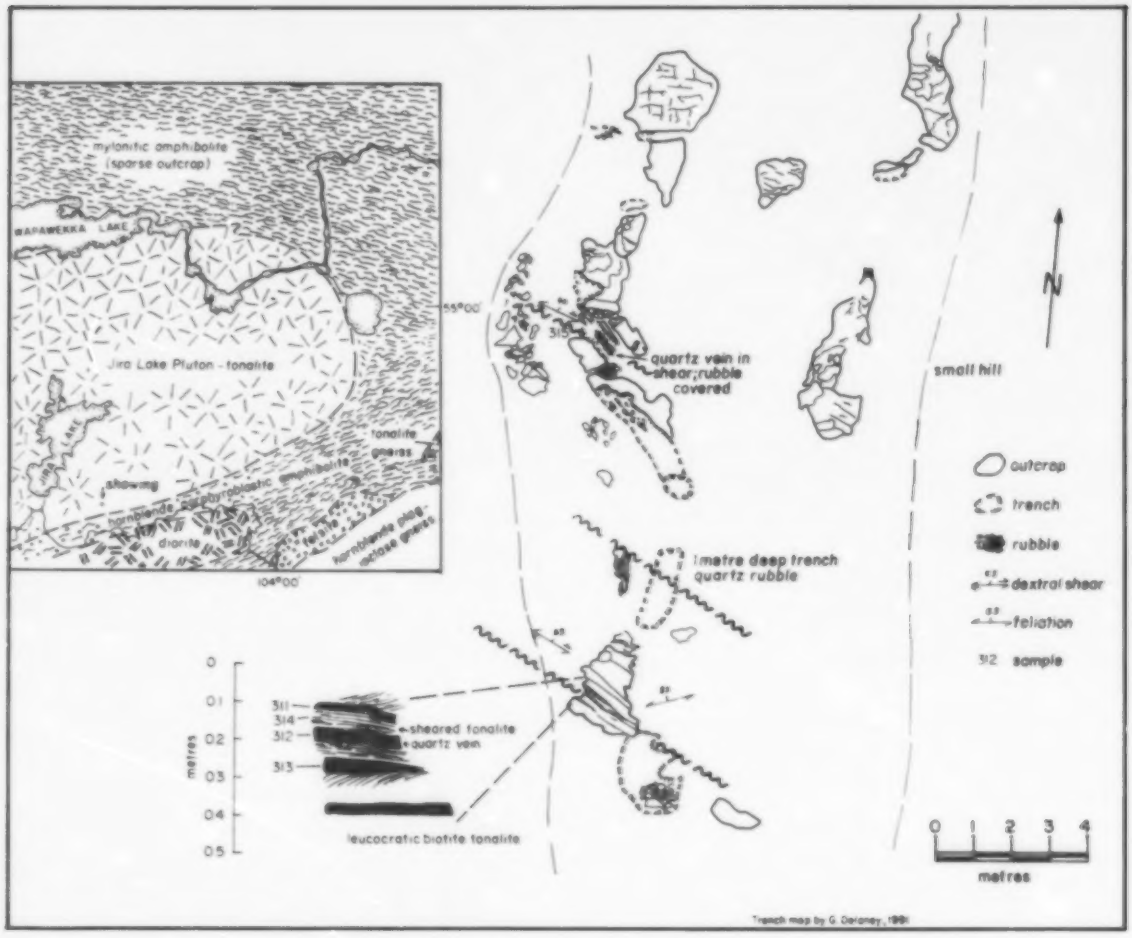


Figure 33 - Outcrop and trench map, Jira Lake Showing. Table 10 contains analytical data for samples 9022-311 to -315 shown on this drawing. Inset is a geological sketch map of the Jira Lake area.

Leland Lake–Robinson Lake Greenstone Belt

Between Irving Lake and Robinson Lake there is a narrow east-southeast-trending belt of mafic to intermediate metavolcanics, layered pyroclastics, greywacke, and minor psammite, pelite and calc-silicate rocks (Figures 2 and 34; Padgham, 1968; Lewry, 1977). Remnants of these rocks are found in the flanking granitoids and are particularly abundant northeast of Robinson Lake in the Wykes Lake area. In the Leland Lake area, the supracrustals are bound to the south by a small lens of gabbro, the Leland Lake Metagabbro, and to the north by the large Leland Lake Quartz Diorite (Lewry, 1977). At Robinson Lake, basic intrusions also occur to the north ('Robinson Lake Amphibolite'; Lewry, 1977) and south ('Chrissy Lake Gabbro'; Chakrabarti, 1969) of the supracrustals. One historical gold showing is known near Leland Lake. As well, a recent intensive exploration program by Cogema Canada Ltd. over a large area that included Leland Lake, has resulted in the discovery of several gold anomalies (SEM Assessment Files 63M-0004 and 63M12-0026).

Leland Lake Area

Leland Lake

Location: Approximately 1 km south-southwest of Leland Lake (No. 1 on Figure 34; UTM co-ordinates 564320 m E, 6154500 m N).

History and Development: The first recorded work was in the period 1956-57 and included trenching, an electromagnetic survey and two packsack diamond drill holes totalling 21 m (69 feet) (SEM Assessment File 63M12-0003). No analytical work is available for this early work. Two small mineral claims S-98402 and S-98405 (Figure 34) were staked over the showing in the early 1980s by E. Partridge. Samples from the old trenches reportedly assayed 0.03 g/t (0.001 oz/ton) to 1.0 g/t (0.030 oz/ton) Au. Panned samples from quartz

Table 10 - Geochemical Analyses for a Suite of Grab Samples from the Jira Lake Showing. Sample locations are shown on Figure 33. Data for all elements (except gold) were obtained by ICP analysis of a 0.500 gram sample digested with 10ML'HClO$_3$-HNO$_3$-HF at 200°C and diluted to 10 ml with diluted aqua regia. This leach is partial for magnetite, chromite, barite, oxides of Al, Zr and Mn and massive sulphide samples. Au analyses by Atomic Absorption from a 10 g sample. Analyses by Acme Laboratories, Vancouver.

Sample No.	9122-311	9122-312	9122-313	9122-314	9122-315
Element					
Mo (ppm)	3	2	4	3	3
Cu (ppm)	160	108	425	147	284
Pb (ppm)	3	2	2	2	4
Zn (ppm)	57	35	31	88	34
Ag (ppm)	0.5	0.2	4.5	0.1	0.4
As (ppm)	5	2	3	6	2
Ba (ppm)	272	59	342	480	50
W (ppm)	9	6	9	12	4
Zr (ppm)	21	3	28	34	6
Sn (ppm)	2	6	1	1	7
Sc (ppm)	4.4	1.1	4.4	10.2	1.3
Au (ppb)	1630	650	8700	300	480
Fe (%)	1.71	1.11	1.77	2.81	2.84
K (%)	1.68	0.36	1.81	2.82	0.26

sericite schist and quartzite contained up to 8.0 g/t (0.233 oz/ton) Au. In 1985, Partridge sold the property to Golden Vale Exploration Corp. and Glory Explorations Ltd. and in 1986 a farm-out agreement was concluded with September Resources. Two large areas were stripped and an eight hole diamond drill program totalling 400 m was completed. The core from this drilling contained no gold values greater than 0.6 g/t (0.018 oz/ton) Au (SEM Assessment File 63M12-0026).

Geological Setting: The area of the showing has been stripped and is underlain by a foliated, tightly folded sequence of basic volcanic flows and tuffs (SEM Assessment File 63M-0004). The sequence contains veins and lenses of pegmatite and tourmaline-bearing quartz parallel to foliation. Also within the sequence is a 2 to 5 m thick, oxidized silicified horizon containing 2 to 5 percent disseminated pyrite and pyrrhotite. This is reported to be the unit with anomalous gold values.

Other Gold Showings

All of the other showings in the Leland Lake–Robinson Lake Greenstone Belt were discovered during a recent grassroots exploration program by Cogema and the history and development of these are described together. This is followed by descriptions of the most significant showings: North Axe Lake, Duck Lake and Irving Lake.

History and Development: After acquiring MPP 1145 in 1984, Claude Resources completed a limited ground geophysical and prospecting program, but no discoveries resulted from this work. In 1986, Cogema Canada Ltd. optioned MPP 1145 and two adjoining claim blocks (CBS 8046 and 8091) from Claude Resources. The 1986 Cogema program included systematic geological mapping and lithogeochemical sampling (SEM Assessment File 63M12-0026) as well as an airborne magnetometer and VLF-EM survey (SEM Assessment File 63M12-0017). This work identified 11 anomalous gold zones. Of these, 7 were recommended for follow-up work. The best gold value, 1400 ppb, occurred on the southeast side of Irving Lake. Some of the best showings appear to be associated with east-trending structures defined by airphoto and VLF-EM lineaments identified during the Cogema work (Figure 34). Follow-up in 1987 indicated that three of the original showings were significant (SEM Assessment File 63M-0004). In 1987, Cogema optioned from Claude Resources additional claim blocks (CBS 7575, 7576, 8033, 8051 and 8055) in the Robinson Lake area. Although no significant gold occurrences were identified, additional follow-up was recommended in two areas where anomalous rock samples were collected: the Robinson Lake Amphibolite Intrusive (Lewry, 1977) and Chrissy Lake Gabbro (Chakrabarti, 1969).

North Axe Lake

Location: Approximately 2.8 km east of the north end of Leland Lake (No. 2 on Figure 34; UTM co-ordinates 569830 m E, 6159270 m N).

Geological Setting: Mineralization is in the Leland Lake Quartz Diorite, a pink to grey-pink, medium- to coarse-grained, generally massive, leucocratic (10 to 15 percent hornblende) quartz diorite (Lewry, 1977). Anomalous gold contents of 100, 241 and 480 ppb were obtained from samples of oxidized grey quartz lenses and veins associated with aplite veins deformed in east-southeast-trending shear zones (SEM Assessment File 63M-0004). Four quartz-aplite veins have been discovered and are reported to range in thickness from 0.5 to 3.0 m and extend for 30 to 50 m along strike.

Duck Lake

Location: About 1.4 km southwest of the southwest corner of Planinshek Lake (No. 3 on Figure 34; UTM co-ordinates 573600 m E, 6154530 m N).

Geological Setting: Mineralization occurs within an east-southeast-trending shear in biotite-amphibole orthogneiss near the contact with a tabular remnant of mafic metavolcanic which strikes parallel to the shear zone (Lewry, 1977; SEM Assessment File 63M-0004). The metavolcanic remnant contains pyrite and pyrrhotite, is silicified, cut by quartz veins and contains gossans. A quartz stockwork is hosted in the 1 m wide zone of mylonitic orthogneiss which forms the shear zone. Aplite veins in the shear zone are cut by the quartz stockwork. Quartz lenses in the shear zone contained up to 3200 ppb Au and the sheared orthogneiss contained 40 to 1100 ppb Au (SEM Assessment File 63M-0004).

Irving Lake Showing

Location: Approximately 1.2 km east of the south end of Irving Lake (No. 4 on Figure 34; UTM co-ordinates 562200 m E, 6155400 m N).

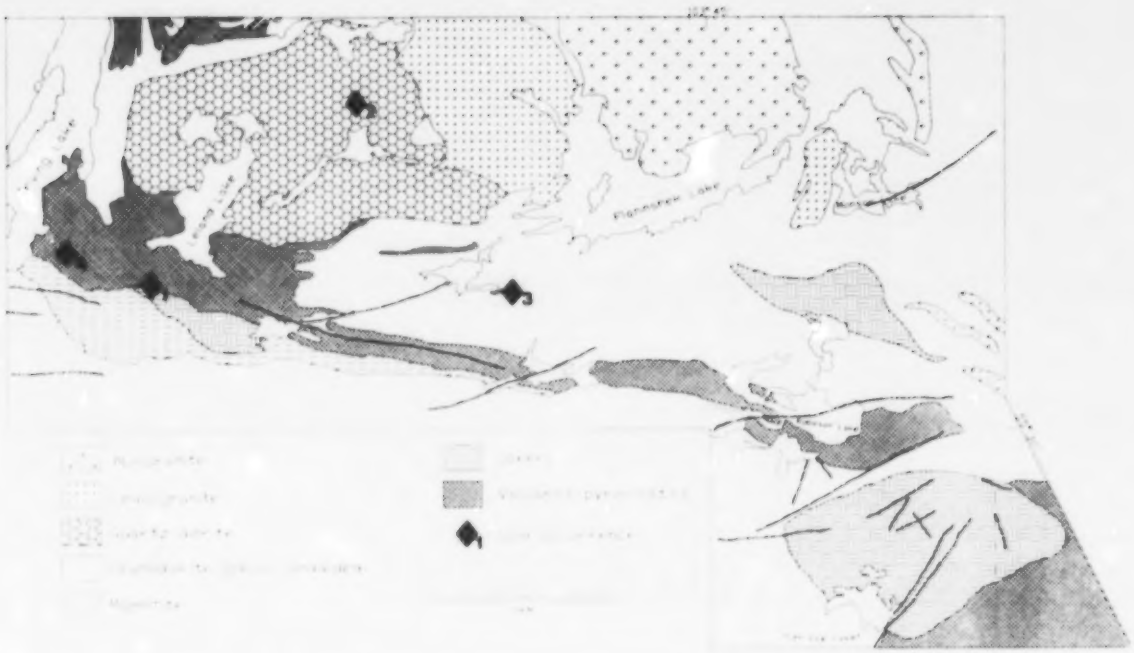


Figure 34 - Geological sketch map of the Leland—Robinson Lakes area showing major lineaments and gold showings. 1 = Leland Lake, 2 = North Axe Lake, 3 = Duck Lake, and 4 = Irving Lake. Geology after Lewry (1977) and SEM Assessment File 63M-0004.

Geological Setting: This showing is in quartz veins in a sequence of garnetiferous basic metavolcanics and tuffs near the contact with a small lens of metagabbro (SEM Assessment File 63M-0004). The metavolcanics have a well developed foliation which trends southeast. The quartz veins have a maximum width of 1.2 m and form an *en echelon* discontinuous array of lenses trending north-northwesterly for a few metres. Strike and depth extension of the veins is reported to be limited. Aplite veins, as well as oxidized and epidotized patches, are present. Five samples of the quartz veins containing pyrite and chalcopyrite assayed 450, 490, 1000, 1400 and 6000 ppb Au. Prospecting south of the showing area discovered additional occurrences of slightly anomalous quartz veins in shear zones. Additional work is required to evaluate the significance of these gold values.

Synthesis

All of the gold deposits and showings have not been examined at the same level of detail since some are exposed in stripped outcrops amenable to detailed mapping while others have no outcrop and can only be studied in drill core and for many their description is based only on the historical record. Detailed multi-element characterization has been determined for a few occurrences. Most samples however, have only been analyzed for a few economically important elements and the complete element association is unknown. As a result, the following observations should be considered as preliminary in nature.

1. All known gold showings occur within or adjacent to greenstone belts. By far the greatest number of showings, as well as the only orebody discovered to date, are hosted in the Pine Lake Greenstone Belt.

2. Although they range in age from 1890 to 1838 Ma, for the greenstone belts included in this study, the volcanics are primarily tholeiitic lavas formed in juvenile island arc and mid-ocean ridge settings.

3. Gold showings in the greenstone belts occur in a variety of rock types: volcanics, plutons (including both subvolcanic and younger post-volcanic suites) volcaniclastics, sediments and migmatites.

4. Those parts of the Glennie Domain with gold showings have been subjected to upper greenschist to amphibolite facies metamorphism.

5. Most gold showings in the Glennie Domain are structurally hosted. A few occurrences are intrusive-hosted (e.g. Kalix, Jena, and Point around the Brownell Lake Pluton) and only one is sediment-hosted (Pine Lake Joint Venture). The formation of other showings was probably due to a combination of processes. For example, some of the showings in the Santoy Lake area may be structurally modified sediment-hosted types. Gold also occurs as a subsidiary phase in volcanogenic massive sulphide showings (e.g. HBED and Brownell Lake properties).

6. Structural controlled showings, although spatially associated with major structures, typically occur in secondary or higher order structures.

7. Structures of certain orientations appear to be more favorable hosts of mineralization than others. For example, secondary high-strain zones west of, and related to, the north-south-trending Tabbernor Fault host mineralization. In the Eisler–Uskik Lakes area, east- to northeast-trending structures, such as the Georges Lake Fault, are favorable.

8. In most structurally-hosted showings, as well as the intrusive and sediment-hosted varieties, gold occurs in quartz vein systems, many of which are multistage.

9. The element association of the quartz veins is variable although some locally distinctive associations are recognised. For example, tourmaline is in most veins within or adjacent to the Laonil Lake Intrusive Complex and arsenopyrite is present in all showings (both structural and plutonic hosted) in the Brownell–Wapawekka Lakes Greenstone Belt.

10. Geochronological data are sparse but, where available, indicate that many of the deposits, including both structural and plutonic-hosted varieties are relatively young in age and post-date one of the last major thermal events (ca. 1830 Ma?) in the Glennie Domain.

Recommendations for Future Work

The formulation of an exploration model for gold in the Glennie Domain is based on the preceding synthesis. Greenstone belts and granitoids flanking them host all known gold showings (Figure 2), consequently these belts are obvious targets for exploration. Furthermore, most showings are hosted in secondary or higher order structures spatially associated with major structures and the definition of these features provides specific target areas.

Recognition of high-strain zones can be accomplished by the integration of a variety of techniques:

1) Lineament studies from airphoto and Landsat Thematic Mapper Imagery (Delaney *et al.*, 1991).

2) Application of image processing techniques to available Federal-Provincial aeromagnetic data as well as proprietary industry total field and gradiometer surveys. The availability of relatively user-friendly microcomputer software has greatly facilitated application of analytical techniques which derive more information from the primary data than traditional manual methods. The successful use of these procedures for major lineament definition has been demonstrated in Ontario (Osmani and Stott, 1988; West, 1989). Recently, Saskatchewan Energy and Mines completed a pilot study to evaluate the applicability of this technique to the identification of major structures in the Glennie Domain (Delaney *et al.*, 1991). Figure 35, a shadow map of total field magnetic data for the Brownell Lake area, illustrates the usefulness of this type of image processing technique for the recognition of structural features.

3) Re-interpretation of existing geological maps by selective remapping. For example, selective remapping by Lewry (Lewry and Macdonald, 1988) near Deschambault Lake in the Oskikebuk Lake mapsheet (Padgham, 1968) indicated that rocks originally interpreted as supracrustals are probably largely highly-strained rocks forming part of a broad heterogeneous deformation zone.

4) Use of ground electromagnetic and magnetic surveys particularly in areas of poor exposure. For example, mineralized high-strain zones such as those at the DD, Georges Lake and Hook Lake showings, were defined by coincident magnetic lows and electromagnetic highs.

Careful evaluation of these high-strain zones might lead to the discovery of further gold showings. For example, a grab sample (Table 7; 8922-89) of a quartz vein-bearing felsite from sheared meta-arkose southeast of Middlemas Lake, on the north side of Wapawekka Lake, yielded 320 ppb Au. Although structurally-hosted gold showings are found in a variety of rock types, some lithologies in secondary high-strain zones are more favorable for gold mineralization than others. For example, nearly every basic to ultrabasic intrusion contains anomalous concentrations of structurally-hosted gold. Examples of some of the more significant showings include the Seabee orebody, the DD Showing, the Manawan Lake showings and the Wing and West Wing showings at Prongua Lake.

In many structurally-hosted showings, mineralized high-strain zones formed in areas of lithologic heterogeneity: at the Seabee orebody, for instance, mineralized high-strain zones are developed adjacent to feldspar porphyry or quartz diorite phases in the gabbro; the Western Zone at the Manawan showings is hosted in a shear zone at the contact between diorite and granodiorite and the Georges Lake showings are localized within or adjacent to deformed felsite lenses and veins in volcanic and volcaniclastic sequences. Where the main structure of the Georges Lake Fault transects a homogeneous lithology such as granodiorite (Gd6 on Figure 12), northeast of Georges Lake, no mineralized zones have been indentified. Shear zones, developed at the contacts of volcanic remnants in granitoid rocks adjacent to greenstone belts, are also favorable sites for gold mineralization such as the Duck Lake Showing in the Leland–Robinson Lakes Greenstone Belt.

Another important factor in prioritizing the potential of high-strain zones is the orientation of the structure. Showings along the north-south-trending Tabbernor Fault, such as the Wilbert and those at Manawan and Prongua Lakes, are localized in subsidiary high-strain zones oriented parallel or subparallel to this major structure. To the west, throughout much of the Glennie Domain, structures that appear to control mineralization, such as the Hartley Shear Zone, faults in the vicinity of Hook Lake, the Georges Lake Fault, the DD shear zone at Eisler Lake and the Laonil Lake Shear Zone, are oriented between northeast and southeast.

Most mineralized quartz veins are characterized by gold in soil anomalies. There are also a number of lesser-used geochemical techniques which have aided in outlining areas of gold mineralization. For example, in a small pilot-scale biogeochemical study around Vein 2 of the Seabee orebody, Dunn (1986) noted significant enrichments in Au, Co, Mo, and W and slight enrichments in As and Cr in vegetation samples. The new discovery of gold mineralization on the Shane Resources property at Munro Lake was made in part by delineating gold grain dispersion anomalies in bulk till samples. On a broader scale, a regional lake sediment geochemical survey by the Geological Survey of Canada (Hornbrook *et al.*, 1975, 1977 and 1985) delineated a zone of elevated arsenic content in samples from the Brownell–Wapawekka Lakes Greenstone Belt. As noted in the review of gold occurrences, arsenopyrite was observed in all gold showings in the Brownell–Wapawekka Lake Greenstone Belt. As more comprehensive investigations of the element associations of gold showings are completed in the Glennie Domain these geochemical techniques will become more important in delineating areas favorable for gold mineralization.

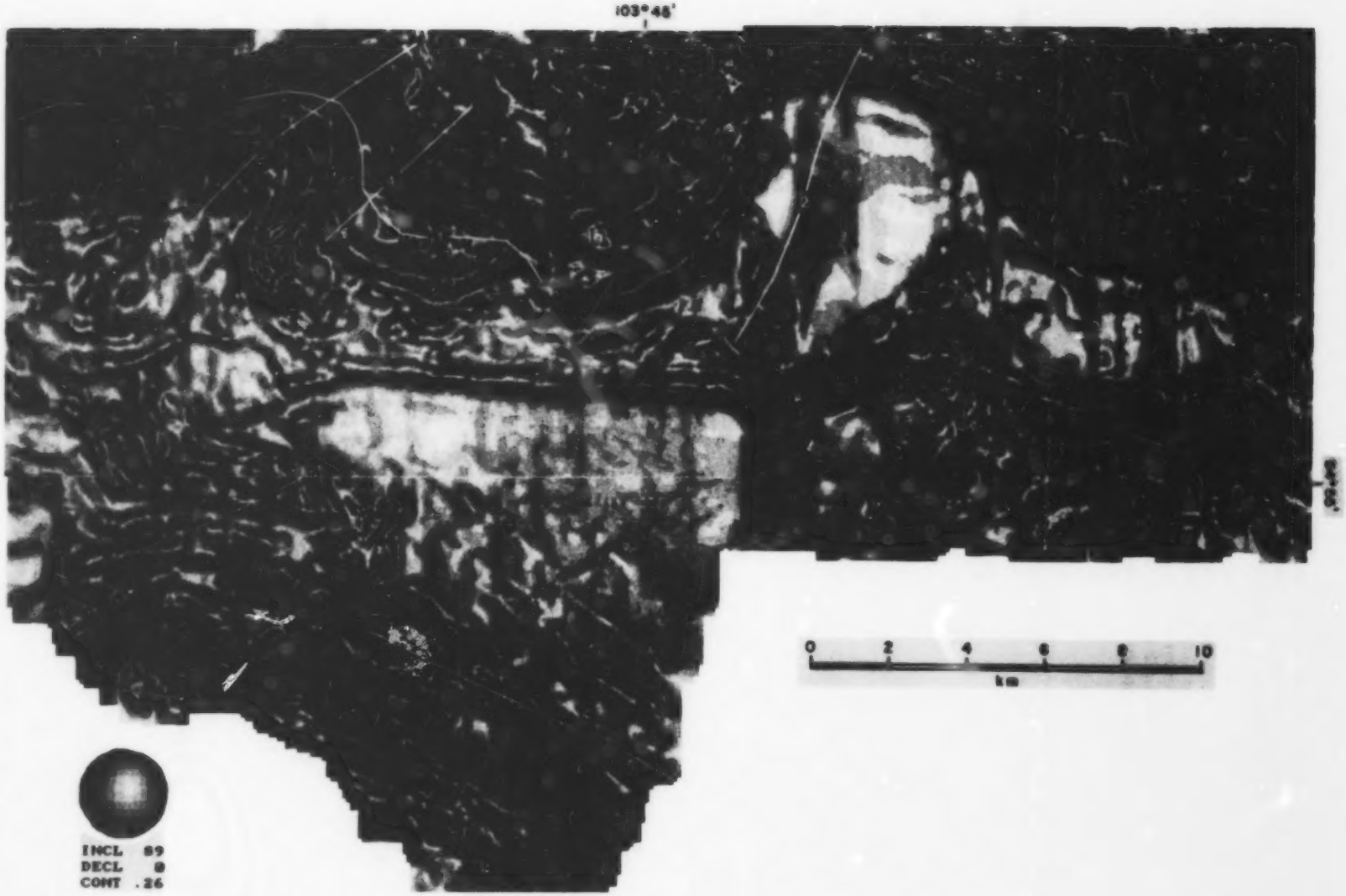


Figure 35 - Shadow map of total field magnetic data for the Brownell Lake area. The sun illumination angle, as indicated by the sphere on the left side of the figure, is near vertical. 1=Brownell Creek Syncline; 2=Brownell Lake Anticline; 3=Maynard Creek Anticline; 4=Brownell Lake Syncline; and 5=Hartley Shear Zone.

In summary it is apparent the Glennie Domain, although commonly underrated in gold exploration strategies, has a high potential for the discovery of additional gold deposits. Over seventy occurrences of gold mineralization have been discovered to date, many of these in recent years.

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